

**2012 Local Groundwater Assistance Grant  
Program Application**

## **Attachment 5. Work Plan**

Preparation of a Salt and Nutrient  
Management Plan for the Northern  
Cities Management Area and the  
Nipomo Mesa Management Area of the  
Santa Maria Groundwater Basin

**City of Arroyo Grande**

July 13, 2012

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Attachment 5.	Work Plan
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Attachment 5. Work Plan.....	5-1
Salt and Nutrient Management Planning .....	5-2
Background .....	5-2
Purpose/Goals/Objectives .....	5-2
Salt and Nutrient Management Plan Preparation .....	5-3
Task 1 Facilitate the Collaborative Process.....	5-3
Task 2 Establish Basin Characteristics .....	5-4
Existing Studies .....	5-4
Basin Characterization .....	5-5
Regulatory Setting.....	5-8
Geographic Information System Database for the Basin.....	5-9
Task 3 Identify Existing and Foreseeable Salt and Nutrient Sources .....	5-10
Task 4 Salt and Nutrient Evaluation.....	5-11
Task 5 Implementation Measures, Goals and Objectives.....	5-12
Task 6 Monitoring Program and Database .....	5-14
Task 7 Prepare Salt and Nutrient Management Plan.....	5-15
Task 8 Quality Assurance and Quality Control.....	5-17
Task 9 CEQA Compliance .....	5-18
Task 10 Project Management .....	5-18
Appendix 5-1. Recycled Water Policy .....	5-19
Appendix 5-2. Central Coast Regional Water Quality Control Board Salt and Nutrient Management Plan Elements .....	5-20
Appendix 5-3. Santa Maria Groundwater Basin Boundaries .....	5-21
Appendix 5-4. SLO County IRWMP Planning Grant Application .....	5-22
Appendix 5-5. Monitoring Program for the Northern Cities Management Area .....	5-23
Appendix 5-6. Monitoring Program for the Nipomo Mesa Management Area .....	5-24



# Salt and Nutrient Management Planning

## Background

The Santa Maria Groundwater Basin (Basin) has been subject to ongoing litigation since 1997. In 2005, a Stipulation signed by many of the litigation parties divided the Basin into three management areas: the Northern Cities Management Area (NCMA); the Nipomo Mesa Management Area (NMMA); and the Santa Maria Valley Management Area (SMVMA), collectively referred to as the “Management Areas”. The Stipulation was substantially accepted by the Court via the January 25, 2008 Judgment. A requirement of the Stipulation was the establishment of Technical Groups (TGs) for each of the Management Areas to develop monitoring plans, administer the provisions of the Stipulation, and share groundwater information with the other management areas. For more information about the Basin adjudication see “Attachment 3. Status of GWMP” of this 2012 LGA Grant application. The extent of the Basin and the boundaries of the three management areas are shown in Appendix 5-3.

The City of Arroyo Grande and members of the NCMA and NMMA TGs believe that developing SNMPs for the Basin is a critical step toward protecting the beneficial uses of the Basin. In fact, the SMVMA agencies have already begun the process of developing a SNMP for the SMVMA. In close coordination with those efforts, the NCMA and the NMMA are working collaboratively to develop a SNMP for the portion of the Basin underlying the two management areas. Hereafter, the process for the development of a SNMP for the portions of the Basin underlying the NCMA and NMMA is referred to as the “Project”.

The State Water Resources Control Board’s (State Water Board) Recycled Water Policy (Policy) states:

“...local water and wastewater entities, together with local salt/nutrient contributing stakeholders, will fund locally driven and controlled, collaborative processes open to all stakeholders that will prepare salt and nutrient management plans for each basin/sub-basin in California...”

The State Water Board’s intention of having local agencies develop Salt and Nutrient Management Plans (SNMP) throughout California is to help achieve their mission to “preserve, enhance and restore the quality of California’s water resources to the benefit of present and future generations.” The State Water Board shares jurisdiction with the Regional Water Quality Control Boards (Regional Water Boards) and both exercise their authority to the fullest extent possible to encourage the use of recycled water and the development of SNMPs. Each Regional Water Board is tasked with providing guidance during the stakeholder led development of a SNMP. The Central Coast Regional Water Quality Control Board (CCRWQCB) is the Regional Water Board who will provide guidance to the NCMA and NMMA during the development of the SNMP for the portion of the Basin underlying the NCMA and NMMA. The CCRWQCB has documented widespread increases in salt and nutrient pollution in groundwater basins throughout the Central Coast Region and has determined that regional management plans and programmatic projects must be developed to protect the beneficial uses of the basins.

## Purpose/Goals/Objectives

The Project is a critical step toward improved groundwater monitoring and management and long term water supply reliability in southern San Luis Obispo County, and is designed to assist the NCMA and

NMMA stakeholders in planning and managing their long term water supply operations and mitigating seawater intrusion. The goals for the Project are as follows:

1. Provide a tool and resource for improved groundwater management to protect and improve groundwater quantity and quality to ensure and improve the long term groundwater supply reliability in the Basin;
2. Provide a water quality framework for development of recycled water and groundwater recharge projects within the Basin;
3. Collect and analyze data to enhance the understanding and management of the Basin; and

Objectives for the Project include:

1. Meet the requirements of the State Water Board's Policy;
2. Utilize data collected for the Project to meet requirements for California Statewide Groundwater Elevation Monitoring (CASGEM) reporting, Groundwater Ambient Monitoring and Assessment (GAMA) reporting, and Court ordered monitoring and management reporting requirements per the GWMP;
3. Develop a conceptual model for the Basin that will serve as the basis for the SNMP, support basin-wide management efforts, and support the future development of a numerical groundwater model;
4. Identify basin management objectives consistent with the CCRWQCB's Water Quality Objectives and Monitoring and Assessment Objectives; the County of San Luis Obispo Integrated Regional Water Management Plan's IRWM Goals and Objectives; as well as the management objectives defined by the Judgment and subsequent annual reports for each of the Management Areas; and
5. Evaluate potential for conjunctive use opportunities or conceptual recharge projects and their effectiveness.

## **Salt and Nutrient Management Plan Preparation**

The Project is a vital step toward improved groundwater resource management and long-term water supply reliability. The following Work Plan identifies tasks and deliverables required to develop the SNMP and achieve the project goals. Work Plan tasks have been established based upon the State Water Board Policy (Appendix 5-1) and SNMP Elements identified by the CCRWQCB (Appendix 5-2).

### ***Task 1 Facilitate the Collaborative Process***

The Policy requires that the SNMP must be developed through "...locally driven and controlled, collaborative processes open to all stakeholders..." Project stakeholders are discussed in "Attachment 4. Project Description" of this 2012 LGA Grant application. The list of stakeholders will be refined through the formation of a steering committee. To ensure stakeholders are engaged in the development of the

SNMP, face-to-face stakeholder meetings will be held to collect data and coordinate the review of deliverables. Meetings shall be coordinated to coincide with key milestones and major deliverables. CCRWQCB staff will be invited to all coordination meetings. Meetings will be held at public facilities and will be open to all interested persons.

If subsequent tasks identify groups whose activities or operations may impact salt and nutrient management in the basin (e.g., agriculture), appropriate representatives of those stakeholders will be identified and added to the project contact list for meetings and distribution of deliverables for review and comment.

***Deliverables:***

***Meeting agendas and minutes.***

***Description of the collaborative process used to engage Stakeholders and the CCRWQCB to develop the SNMP, including: a list of contacted and participating stakeholders; meeting notes from the stakeholder coordination meetings; a detailed list of comments received; and responses supplied on the draft SNMP to include as an Appendix to the SNMP.***

**Task 2 Establish Basin Characteristics**

The Policy states:

“the degree of specificity within these plans and the length of these plans will be dependent on a variety of site-specific factors [including] size and complexity of a basin...hydrogeology, and aquifer water quality.”

This task is to establish basin characteristics that will guide the Plan’s length and specificity.

The basin characteristics will be derived from existing studies. The basin description should include:

- Basin physiography;
- Basin boundaries;
- Watersheds and hydrology, including areas that are tributary to the groundwater basin;
- Climate;
- Beneficial water uses;
- Relevant Water Quality Objectives from the Central Coast Basin Plan (Basin Plan);
- Land uses; and
- Land cover.

A focus will be placed on areas of historically increasing salt or nutrient levels, where such trends may adversely affect any beneficial uses within the next 50 years.

**Existing Studies**

A large portion of the work for this task will be data collection. The hydrology and water quality of the Basin have been studied extensively. The SNMP will build upon the existing studies and planning efforts.

Below is a list of existing studies and plans that will serve as the basis for establishing basin characteristics; this list is not all inclusive.

- California Department of Water Resources [DWR], 1970. Sea-water intrusion: Pismo-Guadalupe area: Bulletin 63-3, 76 p.
- California Department of Water Resources [DWR], 1975. Vegetative Water Use in California, 1974. Bulletin 113-3. April 1975.
- California Department of Water Resources [DWR], 2002. Water resources of the Arroyo Grande Nipomo Mesa area: Southern District Report, 156 p.
- Department of Water Resources. 1994. The Geology of Arroyo Grande-Nipomo Mesa Area, San Luis Obispo County, California.
- Fugro West, Inc., 2007. Hydrogeologic characterization – Southland Wastewater Treatment Facility, Nipomo, California, July 2007.
- GEI Consultants. 2011. Annual Monitoring Report, Northern Cities Management area.
- Luhdorff & Scalmanini Consulting Engineers, 2000. Development of a numerical ground-water flow model and assessment of ground-water basin yield, Santa Maria Valley Ground-water Basin; *prepared for* Santa Maria Valley Water Conservation District.
- Miller, G.A., and Evenson, R.E., 1966. Utilization of ground water in the Santa Maria Valley area: U.S. Geological Survey Water-Supply Paper 1819-A.
- NMMA Technical Group. 2011. Annual Monitoring Report, Nipomo Mesa Management Area
- Papadopoulos, S.S., and Associates, Inc., 2004. Nipomo Mesa groundwater resource capacity study, San Luis Obispo County, California: *prepared for* San Luis Obispo County.
- San Luis Obispo County Department of Public Works. 2007. Integrated Regional Water Management Plan. July 2007.
- Todd Engineers. 2007. Water Balance Study for the Northern Cities Area. Todd Engineers. April 2007.

### Basin Characterization

It is essential that current and foreseeable Basin characterization and groundwater resource management efforts be considered to avoid overlaps in the scope of work for the SNMP. Some examples of current efforts to characterize the Basin have been noted below; this list is not all inclusive.

### Integrated Regional Water Management Plan

The NCMA and NMMA are currently pursuing Integrated Regional Water Management Plan (IRWMP) planning grant funding to improve the characterization of the geology and hydrogeology for the NCMA and NMMA portions of the Basin. The complete scope of basin characterization is included as Appendix 5-4. The proposed scope for the Basin characterization includes the following elements:

- Project Management
- Data Analysis
  - Data Compilation
  - Data Gaps



- Groundwater Basin Characterization
  - Transducer Installation
  - Geologic Cross-Sections
  - Well Testing
  - Surface Water Infiltration
  - Recharge Areas
  - Offshore Aquifers and Seawater Intrusion
- Goals and Objectives
  - Develop Goals and Objectives
  - Climate Change

The results and findings from the groundwater basin characterization projects will be summarized in multiple TMs and will be valuable information for development of the SNMP.

The efforts within the NCMA and NMMA portion of the Basin have been coordinated with the representatives from the SMVMA and are consistent with the work being completed in Santa Barbara County. This coordination between IRWMP areas will ultimately allow for close integration of the Basin planning and management activities being conducted by both IRWMP regions.

#### **NCMA 2011 Annual Report**

The Northern Cities, both individually and jointly, are engaged in water resource management projects, programs, and planning efforts that address water supply and demand issues, particularly efforts to assure a long-term sustainable supply. Major management activities taken in 2011 include:

- Expansion of groundwater monitoring
- Control of Groundwater Levels and Seawater Intrusion
- Cooperative Water Supply Planning and Management
- Water Conservation
- Alternative Water Supply Studies

#### **NMMA 2011 Annual Report**

The following technical recommendations were made in the 2011 Annual Report and are planned to advance with consideration to funding constraints. The following list of technical recommendations has been identified.

- Supplemental Water Supply - An additional water supply that would allow reduced pumping within the NMMA is the most effective method of reducing the stress on the aquifers and allowing groundwater elevations to recover.
- Subsurface Flow Estimates - Continue to develop and evaluate geologic cross-sections along NMMA boundaries and make estimates of subsurface flow.
- Severe Water Shortage Conditions - The TG will evaluate the potential mandatory responses to the Severe Water Shortage Conditions as prescribed in the Stipulation.

- Installation of Groundwater Monitoring Equipment - When a groundwater level is measured in a well, both the length of time since the measured well is shut off and the effect of nearby pumping wells modify the static water level in the well being measured. For the Key Wells, the installation of transducers and data loggers will largely solve this problem. Installation of transducers is also recommended for purveyors' wells that pump much of the time.
- Changes to Monitoring Points or Methods - The inability to locate the monitoring well cluster under the sand dunes proximally north of Oso Flaco Lake renders the southwestern coastal portion of the NMMA without adequate coastal monitoring. The NMMA TG has incorporated replacement of this monitoring well in its long-term capital project planning and will investigate possible State or Federal grants for financial assistance with the construction of this multi-completion monitoring well.
- Well Management Plan - It is recommended that for calendar year 2012, purveyors compile and present to the TG a Well Management Plan status update.
- County of San Luis Obispo Monitoring Locations - Review proposed County of San Luis Obispo monitoring well and stream gauge locations.
- Well Reference Point Evaluations - It is recommended that all the wells used for monitoring have an accurate RP elevation established over time. This could be accomplished by surveying a few wells every year or by working with the other Management Areas and the two counties in the Santa Maria Groundwater Basin to obtain LIDAR data for the region; the accuracy of the LIDAR method allows one-foot contours to be constructed and/or spot elevations to be determined to similar accuracy.
- Groundwater Production - Estimates of total groundwater production are based on a combination of measurements provided freely from some of the parties, and estimates based on land use. The TG recommends developing a method to collect groundwater production data from all stipulating parties. The TG recommends updating the land use classification on an interval commensurate with growth and as is practical with the intention that the interval is more frequent than DWR's 10-year cycle of land use classification.
- Increased Collaboration with Agricultural Producers - To better estimate agricultural groundwater production where data is incomplete, it is recommended that the TG work with a subset of farmers to measure groundwater production. This measured groundwater production can then be used to calibrate models and verify estimates of agricultural groundwater production where data are not available.
- Hydrogeologic Characteristics of NMMA - Further review is needed of well screen intervals, lithology, groundwater level, and other relevant information to segregate wells into the different aquifers groups (e.g. shallow versus deep aquifers) for preparation of groundwater elevation contour maps for different aquifers. In addition, the NMMA will be requesting geologic information obtained during the PG&E long-term seismic studies program.
- Modifications of Water Shortage Conditions Criteria - The Water Shortage Conditions and Response Plan was submitted to the Court in 2008. The TG will review the plan on a regular basis.

- Groundwater Modeling - The TG continues to recommend the advancement of a groundwater model as presented in the NMMA 5-year Cost Analysis. This may include collaboration with the Northern Cities Management Area, the Santa Maria Valley Management Area or both.

### Regulatory Setting

An in depth investigation of the regulatory setting will be conducted to ensure that efforts to develop the SNMP along with implementation and monitoring strategies comply with existing regulations. The following agencies and regulations will have an impact on the Project and make up part of the regulatory setting.

- State Water Board – The State Water Board adopted a Recycled Water Policy with the intent to increase the use of recycled water in a manner that implements state and federal water quality laws. When recycled water is used in compliance with the Policy, Title 22, and all applicable state and federal water quality laws, the State Water Board strongly supports its use as a safe alternative to potable water for approved uses. The Policy requires that Salt and Nutrient Management Plans (SNMPs) are completed by 2014 to facilitate basin-wide management of salts and nutrients from all sources in a manner that optimizes recycled water use while ensuring protection of groundwater supply and beneficial uses, agricultural beneficial uses, and human health. The Policy requires stakeholders to develop implementation plans to meet these objectives for salts and nutrients.
- CCRWQCB – The CCRWQCB is tasked with protecting and maintaining the beneficial use of waters of the state. The overarching document which guides water quality regulation in their jurisdiction is the Basin Plan. The Basin Plan provides the regulatory foundation for the CCRWQCB operations.
- CASGEM – On November 4, 2009 the State Legislature amended the Water Code with SBx7-6, which mandates a statewide groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins. To achieve that goal, the amendment requires collaboration between local monitoring entities and Department of Water Resources (DWR) to collect groundwater elevation data. The intent of the CASGEM program is to establish a permanent, locally-managed program of regular and systematic monitoring in all of California's alluvial groundwater basins. The CASGEM program will rely and build on the many, established local long-term groundwater monitoring and management programs.
- California Environmental Quality Act (CEQA) – The completed SNMP will become an amendment to the CCRWQCB's Basin Plan. Basin Plan amendments are a Certified State Regulatory Program making them exempt from the CEQA process. However, the proposed Basin Plan amendment must still evaluate environmental impacts; comply with noticing requirements; and if significant adverse impacts exist then adopt feasible alternatives or mitigation measures to reduce impacts. The CCRWQCB would be required to evaluate the environmental consequences through its own process.
- IRWMP – The IRWMP Program is intended to promote and practice integrated regional water management to ensure sustainable water uses, reliable water supplies, better water quality,

environmental stewardship, efficient urban development, protection of agriculture, and a strong economy. The San Luis Obispo County Flood Control and Water Conservation District (SLOFC&WCD), in cooperation with the Water Resources Advisory Committee, has developed an IRWM Plan for the region defined as the County boundary. The San Luis Region's IRWMP integrates all of the programs, plans and projects led by entities within the region into water supply, water quality, ecosystem preservation and restoration, groundwater monitoring and management, and flood management programs. The San Luis Obispo County Region IRWMP was originally adopted in December 2005 and amended in July 2007. Coordination between IRWMP planning regions and the TGs will ultimately allow for close integration of Basin planning and management activities being conducted by all management areas and entities within the Basin.

- Groundwater Management Plan – Sections 10750-10756 of the California Water Code (AB 3030) provide a systematic procedure for an existing local agency to develop a groundwater management plan. AB 3030 plans cannot be adopted in adjudicated basins or in basins where groundwater is managed under other sections of the Water Code without the permission of the court or the other agency. The Santa Maria Groundwater Basin's equivalent Groundwater Management Plan (GWMP) is the court ordered adjudication of the Basin. A Stipulation was signed by many of the litigation parties in 2005. A requirement of the Stipulation was the establishment of TGs for the NCMA and NMMA to develop monitoring plans, administer the provisions of the stipulation, and share groundwater information with the other management areas. Each management area is required by the Stipulation to submit annual reports to the Court, which identify monitoring and management efforts within each of the management areas. The Stipulation and subsequent Judgment include provisions for a groundwater monitoring and management program that align with the recommended elements for a GWMP as defined by California Water Code 10753.8. See "Attachment 3. Status of GWMP".

### **Geographic Information System Database for the Basin**

A GIS database will be developed that includes watershed and basin boundaries, impervious areas, land use, open spaces, recreational areas, agricultural areas and crop information, other irrigated areas, parcel information, areas of wastewater discharge to the basin, groundwater recharge areas, and monitoring and production well locations. This information will assist with efforts to further evaluate potential at-risk areas, and to serve as a framework for ongoing data collection and management. The County maintains several GIS datasets that may form the basis of such a project. Updated land use information and water quality data from the County of San Luis Obispo, the CCRWQCB, the United States Geological Survey (USGS), and other available sources will be utilized to form the basis for a GIS tool.

#### ***Deliverables:***

***Basin Characterization that includes: Basin physiography; Basin boundaries; Watersheds and hydrology, including areas that are tributary to the groundwater basin; Climate; Beneficial water uses; Relevant Water Quality Objectives from the Central Coast Basin Plan (Basin Plan); Land uses; and Land cover.***

***Identification and description of relevant land use and regulatory information affecting Basin Characterization.***

***GIS database for the Basin.***

***Task 3 Identify Existing and Foreseeable Salt and Nutrient Sources***

The Policy states:

“...plans shall address and implement provisions, as appropriate, for all sources of salt and/or nutrients to groundwater basins, including recycled water irrigation projects and groundwater recharge reuse projects.”

Existing and possible future projects that may add salt or nutrients to the Basin will be identified, and constituent mass loading from these sources will be estimated. The sources of salt and nutrients for the Basin will be separated into point and non-point sources.

The following tasks will be completed to develop loading from point sources: Research and review existing data (facility master plans, NPDES permit database(s), SLOCFC&WCD Master Water Report, IRWMP, etc.); conduct interviews; develop GIS dataset(s). The following attributes will be summarized for each point source: description; existing and projected mass loading ( $Q_i$ ,  $C_i$ ); location; variability (loading, time); key drivers/issues. Point sources include the following:

- Publicly Owned Treatment Works
- Private WWTPs
- Groundwater replenishment
- Stormwater infiltration basins – Develop a cursory inventory of stormwater infiltration basins within the basin and investigate operating criteria. It is not anticipated that stormwater percolation will be a significant contributor of salts and nutrients.
- Other point sources

The following tasks will be completed to develop loading from non-point sources: Review existing data, conduct interviews, develop additional GIS dataset(s) to complement Task 2. Establish salt loading factors based on land use, crop type, and/or development status. Apply loading factors to parcel database that contains land use, crop type, and occupancy to develop spatially allocated salt and nutrient loading from non-point sources. For each non-point source category, summarize key drivers/issues. Non-point sources include the following:

- Agriculture – Determine agriculture loadings by applying salt and nutrient loading factors to current and projected irrigated crop acreage within the basin.
- Septic systems – Develop loadings from septic systems by applying salt and nutrient loading factors to current and future parcels with septic tank disposal systems.
- Recycled water – Projected use of recycled water will be obtained from the agency Urban Water Management Plans, the SLOCFC&WCD’s Master Water Report, the Regional Recycled Water Strategic Plan (if available) and information provided by Project stakeholders.

- Urban runoff – Determine contributions from urban run-off through research and discussions with the CCRWQCB. It is anticipated that salt and nutrient loading factors will be applied based on land use. The evaluation of urban runoff should be coordinated with the Central Coast Joint Effort to Implement Low Impact Development and Hydromodification Control. The purpose of this effort is to maintain natural hydrology in future urban development (i.e., maintain stormwater recharge). This effort will be described in the SNMP to satisfy the Policy requirement to establish “stormwater recharge/use goals and objectives.”
- Surface flow – Review historical flow and water quality data. Develop estimate mass of salt and nutrient contributions to the basin from these surface water sources. An assessment of live stream flows will be included.
- Subsurface flow - Estimate inflow and outflow of salts and nutrients within the basin and develop estimate of loading.
- Other non-point sources

Where such information is not already available in existing studies, information will be gathered from agencies and organizations with property interests in the Basin and associated sub-basins to determine salt, nutrient, irrigation practice, and chemical loading characteristics of maintenance or management activities.

***Deliverables:***

***Identification and description of known and reasonably foreseeable future sources of salts and nutrients in the basin and sub-basins.***

***Estimates of loading from each current and future identified source. Sources will be geospatially located and presented as GIS layer files.***

***Future loading scenarios that provide the stakeholders with a range expected contributions of salt and nutrients within the basin.***

***Task 4 Salt and Nutrient Evaluation***

The Policy states the SNMP shall include a component that evaluates:

“...assimilative capacity and loading estimates, together with fate and transport of salt and nutrients.”

To address this component of the Policy this task will include:

- A conceptual model of the Basin identifying all groundwater zones/aquifers and showing salt/nutrient and water quantity inputs and outputs from known sources such as adjacent groundwater basins, recharge, point and non-point sources, water purveyors, etc.
- An estimate of the water balance for the Basin.
- An estimate of salt and nutrient balances for existing and planned land and water use, using sources of salt and nutrient loading and the water balance from Task 3 and the water balance from the previous subtasks. This task should be used as the basis for the assimilative capacity analysis.

- An evaluation of existing conditions for the fate and transport of salt and nutrients.
- An evaluation of assimilative capacity of key elements of the groundwater system. This evaluation will be based on 1) characteristics of salt and nutrient sources, 2) transport mechanisms and 3) soil and land use characteristics (such as retention, uptake, removal, and transformation).

Depending on the results of the assimilation capacity analysis, an antidegradation analysis may be required to satisfy the requirements of State Water Board's Resolution 68-16. At the direction of the Stakeholders it may be necessary to conduct an antidegradation analysis pursuant to Resolution 68-16. This may be pursued after a draft of the Plan is completed. If required, this analysis may need to be incorporated in the final SNMP forwarded to the CCRWQCB. The analysis would consist of the following:

- Site and discharge characterization, focusing on relevant sub-basin
- Identification of potential inconsistency with Basin Plan Objectives
- Description of potential effects of discharge on beneficial uses of sub-basin
- Evaluation of alternative reduction in various sources to establish target load reductions
- Evaluation of "best available control technology"
- Evaluation of potential economic consequences of ongoing discharge
- Description of additional measures to address potential inconsistency with Basin Plan

Antidegradation Policy - Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies.

***Deliverables:***

***Conceptual model of the Basin.***

***Assimilative capacity analysis.***

***Recommendation regarding the need for an antidegradation analysis.***

***Task 5 Implementation Measures, Goals and Objectives***

The Policy states the SNMP shall include:

- Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis, and
- Water recycling and stormwater recharge/use goals and objectives.

This task is the culmination of all previous tasks and the most important for the stakeholders. The CCRWQCB may ultimately incorporate these measures into the Water Quality Control Plan, Basin Plan.



This task will start with a review of the Basin Plan to determine whether the existing implementation plan for the Basin remains appropriate. If not, a list of recommended implementation measures for presentation to the stakeholders will need to be developed. The recommended implementation measures should be tailored to each agency and its unique waste loading and environmental settling. Examples of implementation measures that should be evaluated include:

- Control of self-regenerating water softeners;
- Water recycling;
- Removal of nutrients from wastewater discharges;
- Groundwater recharge;
- Implementation of low impact development and hydromodification control (stormwater recharge);
- Recharge area protection/restoration;
- Wellhead protection; and
- Institutional controls such as land use plans and local ordinances.

This task also includes development of quantitative goals and objectives for:

- Salt and nutrient waste load reduction;
- Water conservation;
- Water recycling; and
- Groundwater recharge.

Stakeholder meetings will be held to determine which recommended implementation measures, goals and objectives are truly sustainable and should be incorporated into the Plan. The evaluation will consider the vulnerability of the Basin to effects of climate change and the contribution to climate change implementation measures may have.

Triggers or threshold concentrations of selected salts and nutrients will be proposed that would invoke specific implementation measures. Elements that are required for successful implementation of the measures will be outlined in the plan. These will include: performance measures, implementation schedule, public outreach and education, cost analysis, funding opportunities, institutional arrangements, and organizational structure. Implementation measures will take into consideration the TGs ongoing efforts under the terms of the Stipulation.

***Deliverables:***

***Draft list of recommended implementation measures, goals and objectives for consideration by stakeholders.***

***Draft list of implementation factors including performance measures, implementation schedule, public outreach, and education, cost analysis, funding opportunities as well as institutional arrangements and organizational structure.***



### ***Task 6 Monitoring Program and Database***

The Policy states the SNMP shall include:

“...a basin/sub-basin wide monitoring plan that includes an appropriate network of monitoring locations. The scale of the basin/sub-basin wide monitoring plan is dependent upon the site-specific conditions and shall be adequate to provide cost-effective means of determining whether the concentrations of salt, nutrients, and other constituents of concern as identified in the salt and nutrient plans are consistent with applicable water quality objectives.”

Existing monitoring programs will be evaluated first, before recommending a monitoring program specific to the SNMP. These include, but are not limited to; the Monitoring Program for the NCMA (Appendix 5-5), the Monitoring Program for the NMMA (Appendix 5-6), the County’s ongoing groundwater level monitoring throughout the Basin, and each water and wastewater agency’s individual groundwater monitoring programs. Existing monitoring programs will be described (constituents monitored, frequency, responsible party, how data is disseminated).

If existing monitoring programs are not adequate for determining whether salt and nutrients are consistent with applicable water quality objectives, additional features, constituents, and frequencies will be identified. The preferred approach for developing the monitoring program will be to use existing wells for data collection, where the existing wells provide the spatial coverage necessary to determine water quality throughout the most critical areas of the basin. Additional monitoring locations will be recommended, if necessary. Existing monitoring programs will be optimized to ensure that together they represent a regional monitoring program anticipated by the Policy. The recommended groundwater monitoring program should not result in significant additional ongoing costs.

The monitoring program will be designed to:

- Facilitate salt and nutrient source loading monitoring;
- Facilitate water quality trend analysis;
- Answer the question: Are the relevant water quality objectives of the Central Coast Basin Plan being exceeded or at risk of being exceeded?
- Address required standards for monitoring Constituents of Emerging Concern (CECs)

The State Water Board requires “a provision for annual monitoring of CECs consistent with recommendations by California Department of Public Health and consistent with any actions by the State Water Board...” The State Water Board’s Science Advisory (Blue Ribbon) Panel’s Spring 2010 report on monitoring of CECs found that monitoring of CECs is not a priority where recycled water is used for landscape irrigation.

This task includes analysis of existing available databases, including: GAMA Geotracker; DWR’s CASGEM database; existing TGs databases, and other applicable databases. The task should also provide a recommendation on which database to use for storing monitoring data, in order to ensure applicable State and local agency databases receive the data generated from SNMP implementation.

The monitoring program will identify stakeholders responsible for conducting, compiling and reporting monitoring data under the SNMP. Those responsible for updating the database and the frequency of updates will be specified. The monitoring program will include a requirement that data will be compiled and reported to the CCRWQCB staff at least once every three years.

This task includes developing a cost estimate to implement the recommended monitoring program.

***Deliverables:***

***Draft Groundwater Monitoring Program for review and comment by stakeholders. The Groundwater Monitoring Program will address the following: salt and nutrient source loading, water quality trends, water quality objectives, and CECs.***

***Cost estimate and database recommendations for implementing the Draft Groundwater Monitoring Program.***

***Task 7 Prepare Salt and Nutrient Management Plan***

An initial outline of the proposed SNMP for the Basin is identified below. The outline will likely change based on stakeholder input.

Section 1: Stakeholder Identification and Involvement

Section 2: Santa Maria Groundwater Basin Characteristics

- a. Basin physiography
- b. Basin Boundaries
- c. Watersheds and hydrology
- d. Climate
- e. Beneficial water uses
- f. Water Quality Objectives
- g. Land uses and land cover
- h. Surface water quality
- i. Groundwater quality

Section 3: Salt and Nutrient Sources

- a. Existing salt and nutrient sources
- b. Proposed salt and nutrient sources

Section 4: Salt and Nutrient Evaluation

- a. Conceptual model
- b. Water balance
- c. Salt and nutrient balances
- d. Fate and transport of salt and nutrients
- e. Assimilative capacity
- f. Discussion of future antidegradation analysis, if necessary

#### Section 5: Implementation Measures

- a. Measures to manage salt and nutrient loading
- b. Water recycling and stormwater recharge / use goals and objectives
- c. Management triggers
- d. Performance measures
- e. Implementation schedule
- f. Public outreach and education
- g. Institutional arrangements (e.g., cost sharing agreements between stakeholders)

#### Section 6: Existing Groundwater Monitoring Programs and Databases

- a. Existing database identification and description
- b. Data gaps
- c. Recommended database

#### Section 7: Recommended Salt and Nutrient Monitoring Program

- a. Goals and objectives
- b. Location of monitoring features
- c. Constituents to be monitored
- d. Sampling methodology
- e. Sampling frequency
- f. Stakeholder roles and responsibilities
- g. Reporting, including trend analysis
- h. Cost estimate to implement recommended monitoring program

In Section 1, Stakeholder Identification and Involvement, the stakeholders will be identified and their role in developing the plan will be explained. The process to be followed will be described and key decisions made by the group will be summarized. Public outreach efforts will be described, including briefing of the County Water Resources Advisory Committee (WRAC).

In Section 2, Santa Maria Groundwater Basin Characteristics, key attributes of the Basin will be summarized. Key attributes will be reviewed with the stakeholders to ensure that the document is appropriately focused. All sources used will be cited and a bibliography of relevant documents, data sources, and discussions will be provided.

In Section 3, Salt and Nutrient Sources, the location and relevant attributes of all existing and reasonably foreseeable sources of salt and nutrient will be described. In consultation with the stakeholders and CCRWQCB, specific constituents of discharge that will be the focus of subsequent analyses and plan elements will be identified. As part of this Section, the existing regulatory framework relevant to the Plan will be summarized.

In Section 4, Salt and Nutrient Evaluation, the conceptual model used to frame the evaluation will be presented. The water balance results as well as the analysis techniques and results of the Salt and

Nutrient balance calculations will also be presented. The fate and transport of salt and nutrients will be discussed and will include the rationale of the analysis, assumptions and limitations of the analysis ending with a summary of the implications of its results. A discussion of assimilative capacity will include both an explanation of the concept and the regulatory context for the concept as applied in California. The assimilative capacity of sub-basins identified and consistency with Basin Plan Objectives will also be discussed. If necessary, as directed by the stakeholders, an antidegradation analysis will be performed.

In Section 5, Implementation Measures, the Goals and Objectives of the Plan and their rationale will be presented. The Implementation Measures to manage loading and the rationale behind each measure will also be presented. Included in the discussion will be thresholds or “triggers” that would signal implementation of various measures. Each measure would include methods to track success (“performance measures”) and demonstrate compliance with the Plan. As they relate to water quality, goals and objectives for water recycling and groundwater recharge by storm water would be included in this section. For each element of the Plan, an implementation schedule would be included along with the identification of institutional arrangements to address cost sharing, responsibility, reporting as well as overall SNMP review. This Section will include a discussion of ongoing public outreach and education.

In Section 6, Existing Groundwater Monitoring Programs and Databases, existing data collection programs, the nature and accessibility of collected data, and an evaluation of shortcomings with respect to the salt and nutrient planning process (a “gaps analysis”) will be described. Recommendations for developing and managing a database for the plan including sources of data, architecture of the database and mandates for data sharing (reports to CCRWQCB) will be included.

In Section 7, the Recommended Salt and Nutrient Monitoring Program may stand as a separate document to facilitate implementation and future modification. This section will provide the purpose and need for the monitoring program as a basis for understanding the goals and objectives. The Monitoring Program description will include key attributes as well as sampling and data management protocols. The discussion will establish stakeholder roles and responsibilities. The Monitoring Program will contain specific provisions for data reporting and trend analysis, as well as provisions for modifying the Program in the future.

***Deliverable:***

***Salt and Nutrient Management Plan***

***Task 8 Quality Assurance and Quality Control***

This task includes technical review by qualified professionals that are experienced in groundwater management. This review will ensure the SNMP meets the expectations of the stakeholders and meets the requirements of the Recycled Water Policy.

***Deliverable:***

***Comments on the draft SNMP.***

***Task 9 CEQA Compliance***

The completed SNMP will become an amendment to the CCRWQCB's Basin Plan. Basin Plan amendments are a Certified State Regulatory Program making them exempt from the California Environmental Quality Act (CEQA) process. However, the proposed Basin Plan amendment must still evaluate environmental impacts; comply with noticing requirements; and if significant adverse impacts exist then adopt feasible alternatives or mitigation measures to reduce impacts. The CCRWQCB would be required to evaluate the environmental consequences through its own process.

***Task 10 Project Management***

This task includes general project management and coordination during the initial project start up, procurement of any necessary sub-contractors, and preparation of the SNMP. This includes preparing monthly invoices and progress reports. Project management activities will continue throughout the duration of the project.

***Deliverable:***

***Monthly invoices and progress reports.***



## Appendix 5-1. Recycled Water Policy





## Recycled Water Policy

### 1. *Preamble*

California is facing an unprecedented water crisis.

The collapse of the Bay-Delta ecosystem, climate change, and continuing population growth have combined with a severe drought on the Colorado River and failing levees in the Delta to create a new reality that challenges California's ability to provide the clean water needed for a healthy environment, a healthy population and a healthy economy, both now and in the future.

These challenges also present an unparalleled opportunity for California to move aggressively towards a sustainable water future. The State Water Resources Control Board (State Water Board) declares that we will achieve our mission to "preserve, enhance and restore the quality of California's water resources to the benefit of present and future generations." To achieve that mission, we support and encourage every region in California to develop a salt/nutrient management plan by 2014 that is sustainable on a long-term basis and that provides California with clean, abundant water. These plans shall be consistent with the Department of Water Resources' Bulletin 160, as appropriate, and shall be locally developed, locally controlled and recognize the variability of California's water supplies and the diversity of its waterways. We strongly encourage local and regional water agencies to move toward clean, abundant, local water for California by emphasizing appropriate water recycling, water conservation, and maintenance of supply infrastructure and the use of stormwater (including dry-weather urban runoff) in these plans; these sources of supply are drought-proof, reliable, and minimize our carbon footprint and can be sustained over the long-term.

We declare our independence from relying on the vagaries of annual precipitation and move towards sustainable management of surface waters and groundwater, together with enhanced water conservation, water reuse and the use of stormwater. To this end, we adopt the following goals for California:

- Increase the use of recycled water over 2002 levels by at least one million acre-feet per year (afy) by 2020 and by at least two million afy by 2030.
- Increase the use of stormwater over use in 2007 by at least 500,000 afy by 2020 and by at least one million afy by 2030.
- Increase the amount of water conserved in urban and industrial uses by comparison to 2007 by at least 20 percent by 2020.
- Included in these goals is the substitution of as much recycled water for potable water as possible by 2030.

The purpose of this Policy is to increase the use of recycled water from municipal wastewater sources that meets the definition in Water Code section 13050(n), in a manner that implements state and federal water quality laws. The State Water Board expects to

develop additional policies to encourage the use of stormwater, encourage water conservation, encourage the conjunctive use of surface and groundwater, and improve the use of local water supplies.

When used in compliance with this Policy, Title 22 and all applicable state and federal water quality laws, the State Water Board finds that recycled water is safe for approved uses, and strongly supports recycled water as a safe alternative to potable water for such approved uses.

## 2. *Purpose of the Policy*

- a. The purpose of this Policy is to provide direction to the Regional Water Quality Control Boards (Regional Water Boards), proponents of recycled water projects, and the public regarding the appropriate criteria to be used by the State Water Board and the Regional Water Boards in issuing permits for recycled water projects.
- b. It is the intent of the State Water Board that all elements of this Policy are to be interpreted in a manner that fully implements state and federal water quality laws and regulations in order to enhance the environment and put the waters of the state to the fullest use of which they are capable.
- c. This Policy describes permitting criteria that are intended to streamline the permitting of the vast majority of recycled water projects. The intent of this streamlined permit process is to expedite the implementation of recycled water projects in a manner that implements state and federal water quality laws while allowing the Regional Water Boards to focus their limited resources on projects that require substantial regulatory review due to unique site-specific conditions.
- d. By prescribing permitting criteria that apply to the vast majority of recycled water projects, it is the State Water Board's intent to maximize consistency in the permitting of recycled water projects in California while also reserving to the Regional Water Boards sufficient authority and flexibility to address site-specific conditions.
- e. The State Water Board will establish additional policies that are intended to assist the State of California in meeting the goals established in the preamble to this Policy for water conservation and the use of stormwater.
- f. For purposes of this Policy, the term "permit" means an order adopted by a Regional Water Board or the State Water Board prescribing requirements for a recycled water project, including but not limited to water recycling requirements, master reclamation permits, and waste discharge requirements.

## 3. *Benefits of Recycled Water*

The State Water Board finds that the use of recycled water in accordance with this Policy, that is, which supports the sustainable use of groundwater and/or surface water, which is

sufficiently treated so as not to adversely impact public health or the environment and which ideally substitutes for use of potable water, is presumed to have a beneficial impact. Other public agencies are encouraged to use this presumption in evaluating the impacts of recycled water projects on the environment as required by the California Environmental Quality Act (CEQA).

4. *Mandate for the Use of Recycled Water*

- a. The State Water Board and Regional Water Boards will exercise the authority granted to them by the Legislature to the fullest extent possible to encourage the use of recycled water, consistent with state and federal water quality laws.
  - (1) The State Water Board hereby establishes a mandate to increase the use of recycled water in California by 200,000 afy by 2020 and by an additional 300,000 afy by 2030. These mandates shall be achieved through the cooperation and collaboration of the State Water Board, the Regional Water Boards, the environmental community, water purveyors and the operators of publicly owned treatment works. The State Water Board will evaluate progress toward these mandates biennially and review and revise as necessary the implementation provisions of this Policy in 2012 and 2016.
  - (2) Agencies producing recycled water that is available for reuse and not being put to beneficial use shall make that recycled water available to water purveyors for reuse on reasonable terms and conditions. Such terms and conditions may include payment by the water purveyor of a fair and reasonable share of the cost of the recycled water supply and facilities.
  - (3) The State Water Board hereby declares that, pursuant to Water Code sections 13550 *et seq.*, it is a waste and unreasonable use of water for water agencies not to use recycled water when recycled water of adequate quality is available and is not being put to beneficial use, subject to the conditions established in sections 13550 *et seq.* The State Water Board shall exercise its authority pursuant to Water Code section 275 to the fullest extent possible to enforce the mandates of this subparagraph.
- b. These mandates are contingent on the availability of sufficient capital funding for the construction of recycled water projects from private, local, state, and federal sources and assume that the Regional Water Boards will effectively implement regulatory streamlining in accordance with this Policy.
- c. The water industry and the environmental community have agreed jointly to advocate for \$1 billion in state and federal funds over the next five years to fund projects needed to meet the goals and mandates for the use of recycled water established in this Policy.

- d. The State Water Board requests the California Department of Public Health (CDPH), the California Public Utilities Commission (CPUC), and the California Department of Water Resources (CDWR) to use their respective authorities to the fullest extent practicable to assist the State Water Board and the Regional Water Boards in increasing the use of recycled water in California.

5. *Roles of the State Water Board, Regional Water Boards, CDPH and CDWR*

The State Water Board recognizes that it shares jurisdiction over the use of recycled water with the Regional Water Boards and with CDPH. In addition, the State Water Board recognizes that CDWR and the CPUC have important roles to play in encouraging the use of recycled water. The State Water Board believes that it is important to clarify the respective roles of each of these agencies in connection with recycled water projects, as follows:

- a. The State Water Board establishes general policies governing the permitting of recycled water projects consistent with its role of protecting water quality and sustaining water supplies. The State Water Board exercises general oversight over recycled water projects, including review of Regional Water Board permitting practices, and shall lead the effort to meet the recycled water use goals set forth in the Preamble to this Policy. The State Water Board is also charged by statute with developing a general permit for irrigation uses of recycled water.
- b. The CDPH is charged with protection of public health and drinking water supplies and with the development of uniform water recycling criteria appropriate to particular uses of water. Regional Water Boards shall appropriately rely on the expertise of CDPH for the establishment of permit conditions needed to protect human health.
- c. The Regional Water Boards are charged with protection of surface and groundwater resources and with the issuance of permits that implement CDPH recommendations, this Policy, and applicable law and will, pursuant to paragraph 4 of this Policy, use their authority to the fullest extent possible to encourage the use of recycled water.
- d. CDWR is charged with reviewing and, every five years, updating the California Water Plan, including evaluating the quantity of recycled water presently being used and planning for the potential for future uses of recycled water. In undertaking these tasks, CDWR may appropriately rely on urban water management plans and may share the data from those plans with the State Water Board and the Regional Water Boards. CDWR also shares with the State Water Board the authority to allocate and distribute bond funding, which can provide incentives for the use of recycled water.
- e. The CPUC is charged with approving rates and terms of service for the use of recycled water by investor-owned utilities.

6. *Salt/Nutrient Management Plans*

a. *Introduction.*

- (1) Some groundwater basins in the state contain salts and nutrients that exceed or threaten to exceed water quality objectives established in the applicable Water Quality Control Plans (Basin Plans), and not all Basin Plans include adequate implementation procedures for achieving or ensuring compliance with the water quality objectives for salt or nutrients. These conditions can be caused by natural soils/conditions, discharges of waste, irrigation using surface water, groundwater or recycled water and water supply augmentation using surface or recycled water. Regulation of recycled water alone will not address these conditions.
- (2) It is the intent of this Policy that salts and nutrients from all sources be managed on a basin-wide or watershed-wide basis in a manner that ensures attainment of water quality objectives and protection of beneficial uses. The State Water Board finds that the appropriate way to address salt and nutrient issues is through the development of regional or subregional salt and nutrient management plans rather than through imposing requirements solely on individual recycled water projects.

b. *Adoption of Salt/ Nutrient Management Plans.*

- (1) The State Water Board recognizes that, pursuant to the letter dated December 19, 2008 and attached to the Resolution adopting this Policy, the local water and wastewater entities, together with local salt/nutrient contributing stakeholders, will fund locally driven and controlled, collaborative processes open to all stakeholders that will prepare salt and nutrient management plans for each basin/sub-basin in California, including compliance with CEQA and participation by Regional Water Board staff.
  - (a) It is the intent of this Policy for every groundwater basin/sub-basin in California to have a consistent salt/nutrient management plan. The degree of specificity within these plans and the length of these plans will be dependent on a variety of site-specific factors, including but not limited to size and complexity of a basin, source water quality, stormwater recharge, hydrogeology, and aquifer water quality. It is also the intent of the State Water Board that because stormwater is typically lower in nutrients and salts and can augment local water supplies, inclusion of a significant stormwater use and recharge component within the salt/nutrient management plans is critical to the long-term sustainable use of water in California. Inclusion of stormwater recharge is consistent with State Water Board Resolution No. 2005-06, which establishes sustainability as a core value for State Water Board programs and

also assists in implementing Resolution No. 2008-30, which requires sustainable water resources management and is consistent with Objective 3.2 of the State Water Board Strategic Plan Update dated September 2, 2008.

- (b) Salt and nutrient plans shall be tailored to address the water quality concerns in each basin/sub-basin and may include constituents other than salt and nutrients that impact water quality in the basin/sub-basin. Such plans shall address and implement provisions, as appropriate, for all sources of salt and/or nutrients to groundwater basins, including recycled water irrigation projects and groundwater recharge reuse projects.
  - (c) Such plans may be developed or funded pursuant to the provisions of Water Code sections 10750 *et seq.* or other appropriate authority.
  - (d) Salt and nutrient plans shall be completed and proposed to the Regional Water Board within five years from the date of this Policy unless a Regional Water Board finds that the stakeholders are making substantial progress towards completion of a plan. In no case shall the period for the completion of a plan exceed seven years.
  - (e) The requirements of this paragraph shall not apply to areas that have already completed a Regional Water Board approved salt and nutrient plan for a basin, sub-basin, or other regional planning area that is functionally equivalent to paragraph 6(b)3.
  - (f) The plans may, depending upon the local situation, address constituents other than salt and nutrients that adversely affect groundwater quality.
- (2) Within one year of the receipt of a proposed salt and nutrient management plan, the Regional Water Boards shall consider for adoption revised implementation plans, consistent with Water Code section 13242, for those groundwater basins within their regions where water quality objectives for salts or nutrients are being, or are threatening to be, exceeded. The implementation plans shall be based on the salt and nutrient plans required by this Policy.
  - (3) Each salt and nutrient management plan shall include the following components:
    - (a) A basin/sub-basin wide monitoring plan that includes an appropriate network of monitoring locations. The scale of the basin/sub-basin monitoring plan is dependent upon the site-specific conditions and shall be adequate to provide a reasonable,

cost-effective means of determining whether the concentrations of salt, nutrients, and other constituents of concern as identified in the salt and nutrient plans are consistent with applicable water quality objectives. Salts, nutrients, and the constituents identified in paragraph 6(b)(1)(f) shall be monitored. The frequency of monitoring shall be determined in the salt/nutrient management plan and approved by the Regional Water Board pursuant to paragraph 6(b)(2).

- (i) The monitoring plan must be designed to determine water quality in the basin. The plan must focus on basin water quality near water supply wells and areas proximate to large water recycling projects, particularly groundwater recharge projects. Also, monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with adjacent surface waters.
  - (ii) The preferred approach to monitoring plan development is to collect samples from existing wells if feasible as long as the existing wells are located appropriately to determine water quality throughout the most critical areas of the basin.
  - (iii) The monitoring plan shall identify those stakeholders responsible for conducting, compiling, and reporting the monitoring data. The data shall be reported to the Regional Water Board at least every three years.
- (b) A provision for annual monitoring of Emerging Constituents/ Constituents of Emerging Concern (e.g., endocrine disrupters, personal care products or pharmaceuticals) (CECs) consistent with recommendations by CDPH and consistent with any actions by the State Water Board taken pursuant to paragraph 10(b) of this Policy.
- (c) Water recycling and stormwater recharge/use goals and objectives.
- (d) Salt and nutrient source identification, basin/sub-basin assimilative capacity and loading estimates, together with fate and transport of salts and nutrients.
- (e) Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis.
- (f) An antidegradation analysis demonstrating that the projects included within the plan will, collectively, satisfy the requirements of Resolution No. 68-16.

- (4) Nothing in this Policy shall prevent stakeholders from developing a plan that is more protective of water quality than applicable standards in the Basin Plan. No Regional Water Board, however, shall seek to modify Basin Plan objectives without full compliance with the process for such modification as established by existing law.

7. *Landscape Irrigation Projects*

- a. *Control of incidental runoff.* Incidental runoff is defined as unintended small amounts (volume) of runoff from recycled water use areas, such as unintended, minimal over-spray from sprinklers that escapes the recycled water use area. Water leaving a recycled water use area is not considered incidental if it is part of the facility design, if it is due to excessive application, if it is due to intentional overflow or application, or if it is due to negligence. Incidental runoff may be regulated by waste discharge requirements or, where necessary, waste discharge requirements that serve as a National Pollutant Discharge Elimination System (NPDES) permit, including municipal separate storm water system permits, but regardless of the regulatory instrument, the project shall include, but is not limited to, the following practices:

- (1) Implementation of an operations and management plan that may apply to multiple sites and provides for detection of leaks, (for example, from broken sprinkler heads), and correction either within 72 hours of learning of the runoff, or prior to the release of 1,000 gallons, whichever occurs first,
- (2) Proper design and aim of sprinkler heads,
- (3) Refraining from application during precipitation events, and
- (4) Management of any ponds containing recycled water such that no discharge occurs unless the discharge is a result of a 25-year, 24-hour storm event or greater, and there is notification of the appropriate Regional Water Board Executive Officer of the discharge.

- b. *Streamlined Permitting*

- (1) The Regional Water Boards shall, absent unusual circumstances (i.e., unique, site-specific conditions such as where recycled water is proposed to be used for irrigation over high transmissivity soils over a shallow (5' or less) high quality groundwater aquifer), permit recycled water projects that meet the criteria set forth in this Policy, consistent with the provisions of this paragraph.
- (2) If the Regional Water Board determines that unusual circumstances apply, the Regional Water Board shall make a finding of unusual circumstances based on substantial evidence in the record, after public notice and hearing.



- (3) Projects meeting the criteria set forth below and eligible for enrollment under requirements established in a general order shall be enrolled by the State or Regional Water Board within 60 days from the date on which an application is deemed complete by the State or Regional Water Board. For projects that are not enrolled in a general order, the Regional Water Board shall consider permit adoption within 120 days from the date on which the application is deemed complete by the Regional Water Board.
  - (4) Landscape irrigation projects that qualify for streamlined permitting shall not be required to include a project specific receiving water and groundwater monitoring component unless such project specific monitoring is required under the adopted salt/nutrient management plan. During the interim while the salt management plan is under development, a landscape irrigation project proponent can either perform project specific monitoring, or actively participate in the development and implementation of a salt/nutrient management plan, including basin/sub-basin monitoring. Permits or requirements for landscape irrigation projects shall include, in addition to any other appropriate recycled water monitoring requirements, recycled water monitoring for CECs on an annual basis and priority pollutants on a twice annual basis. Except as requested by CDPH, State and Regional Water Board monitoring requirements for CECs shall not take effect until 18 months after the effective date of this Policy. In addition, any permits shall include a permit reopener to allow incorporation of appropriate monitoring requirements for CECs after State Water Board action under paragraph 10(b)(2).
  - (5) It is the intent of the State Water Board that the general permit for landscape irrigation projects be consistent with the terms of this Policy.
- c. *Criteria for streamlined permitting.* Irrigation projects using recycled water that meet the following criteria are eligible for streamlined permitting, and, if otherwise in compliance with applicable laws, shall be approved absent unusual circumstances:
- (1) Compliance with the requirements for recycled water established in Title 22 of the California Code of Regulations, including the requirements for treatment and use area restrictions, together with any other recommendations by CDPH pursuant to Water Code section 13523.
  - (2) Application in amounts and at rates as needed for the landscape (i.e., at agronomic rates and not when the soil is saturated). Each irrigation project shall be subject to an operations and management plan, that may apply to multiple sites, provided to the Regional Water Board that specifies the agronomic rate(s) and describes a set of reasonably practicable measures to ensure compliance with this requirement, which may include the development of water budgets for use areas, site

supervisor training, periodic inspections, tiered rate structures, the use of smart controllers, or other appropriate measures.

- (3) Compliance with any applicable salt and nutrient management plan.
- (4) Appropriate use of fertilizers that takes into account the nutrient levels in the recycled water. Recycled water producers shall monitor and communicate to the users the nutrient levels in their recycled water.

8. *Recycled Water Groundwater Recharge Projects*

- a. The State Water Board acknowledges that all recycled water groundwater recharge projects must be reviewed and permitted on a site-specific basis, and so such projects will require project-by-project review.
- b. Approved groundwater recharge projects will meet the following criteria:
  - (1) Compliance with regulations adopted by CDPH for groundwater recharge projects or, in the interim until such regulations are approved, CDPH's recommendations pursuant to Water Code section 13523 for the project (e.g., level of treatment, retention time, setback distance, source control, monitoring program, etc.).
  - (2) Implementation of a monitoring program for constituents of concern and a monitoring program for CECs that is consistent with any actions by the State Water Board taken pursuant to paragraph 10(b) of this Policy and that takes into account site-specific conditions. Groundwater recharge projects shall include monitoring of recycled water for CECs on an annual basis and priority pollutants on a twice annual basis.
- c. Nothing in this paragraph shall be construed to limit the authority of a Regional Water Board to protect designated beneficial uses, *provided* that any proposed limitations for the protection of public health may only be imposed following regular consultation by the Regional Water Board with CDPH, consistent with State Water Board Orders WQ 2005-0007 and 2006-0001.
- d. Nothing in this Policy shall be construed to prevent a Regional Water Board from imposing additional requirements for a proposed recharge project that has a substantial adverse effect on the fate and transport of a contaminant plume or changes the geochemistry of an aquifer thereby causing the dissolution of constituents, such as arsenic, from the geologic formation into groundwater.
- e. Projects that utilize surface spreading to recharge groundwater with recycled water treated by reverse osmosis shall be permitted by a Regional Water Board within one year of receipt of recommendations from CDPH. Furthermore, the Regional Water Board shall give a high priority to review and approval of such projects.

9. *Antidegradation*

- a. The State Water Board adopted Resolution No. 68-16 as a policy statement to implement the Legislature's intent that waters of the state shall be regulated to achieve the highest water quality consistent with the maximum benefit to the people of the state.
- b. Activities involving the disposal of waste that could impact high quality waters are required to implement best practicable treatment or control of the discharge necessary to ensure that pollution or nuisance will not occur, and the highest water quality consistent with the maximum benefit to the people of the state will be maintained.
- c. Groundwater recharge with recycled water for later extraction and use in accordance with this Policy and state and federal water quality law is to the benefit of the people of the state of California. Nonetheless, the State Water Board finds that groundwater recharge projects using recycled water have the potential to lower water quality within a basin. The proponent of a groundwater recharge project must demonstrate compliance with Resolution No. 68-16. Until such time as a salt/nutrient management plan is in effect, such compliance may be demonstrated as follows:
  - (1) A project that utilizes less than 10 percent of the available assimilative capacity in a basin/sub-basin (or multiple projects utilizing less than 20 percent of the available assimilative capacity in a basin/sub-basin) need only conduct an antidegradation analysis verifying the use of the assimilative capacity. For those basins/sub-basins where the Regional Water Boards have not determined the baseline assimilative capacity, the baseline assimilative capacity shall be calculated by the initial project proponent, with review and approval by the Regional Water Board, until such time as the salt/nutrient plan is approved by the Regional Water Board and is in effect. For compliance with this subparagraph, the available assimilative capacity shall be calculated by comparing the mineral water quality objective with the average concentration of the basin/sub-basin, either over the most recent five years of data available or using a data set approved by the Regional Water Board Executive Officer. In determining whether the available assimilative capacity will be exceeded by the project or projects, the Regional Water Board shall calculate the impacts of the project or projects over at least a ten year time frame.

- (2) In the event a project or multiple projects utilize more than the fraction of the assimilative capacity designated in subparagraph (1), then a Regional Water Board-deemed acceptable antidegradation analysis shall be performed to comply with Resolution No. 68-16. The project proponent shall provide sufficient information for the Regional Water Board to make this determination. An example of an approved method is the method used by the State Water Board in connection with Resolution No. 2004-0060 and the Regional Water Board in connection with Resolution No. R8-2004-0001. An integrated approach (using surface water, groundwater, recycled water, stormwater, pollution prevention, water conservation, etc.) to the implementation of Resolution No. 68-16 is encouraged.
- d. Landscape irrigation with recycled water in accordance with this Policy is to the benefit of the people of the State of California. Nonetheless, the State Water Board finds that the use of water for irrigation may, regardless of its source, collectively affect groundwater quality over time. The State Water Board intends to address these impacts in part through the development of salt/nutrient management plans described in paragraph 6.
  - (1) A project that meets the criteria for a streamlined irrigation permit and is within a basin where a salt/nutrient management plan satisfying the provisions of paragraph 6(b) is in place may be approved without further antidegradation analysis, provided that the project is consistent with that plan.
  - (2) A project that meets the criteria for a streamlined irrigation permit and is within a basin where a salt/nutrient management plan satisfying the provisions of paragraph 6(b) is being prepared may be approved by the Regional Water Board by demonstrating through a salt/nutrient mass balance or similar analysis that the project uses less than 10 percent of the available assimilative capacity as estimated by the project proponent in a basin/sub-basin (or multiple projects using less than 20 percent of the available assimilative capacity as estimated by the project proponent in a groundwater basin).

# 10. *Emerging Constituents/Chemicals of Emerging Concern*

## a. *General Provisions*

- (1) Regulatory requirements for recycled water shall be based on the best available peer-reviewed science. In addition, all uses of recycled water must meet conditions set by CDPH.
- (2) Knowledge of risks will change over time and recycled water projects must meet legally applicable criteria. However, when standards change, projects should be allowed time to comply through a compliance schedule.

- (3) The state of knowledge regarding CECs is incomplete. There needs to be additional research and development of analytical methods and surrogates to determine potential environmental and public health impacts. Agencies should minimize the likelihood of CECs impacting human health and the environment by means of source control and/or pollution prevention programs.
  - (4) Regulating most CECs will require significant work to develop test methods and more specific determinations as to how and at what level CECs impact public health or our environment.
- b. *Research Program.* The State Water Board, in consultation with CDPH and within 90 days of the adoption of this Policy, shall convene a “blue-ribbon” advisory panel to guide future actions relating to constituents of emerging concern.
- (1) The panel shall be actively managed by the State Water Board and shall be composed of at least the following: one human health toxicologist, one environmental toxicologist, one epidemiologist, one biochemist, one civil engineer familiar with the design and construction of recycled water treatment facilities, and one chemist familiar with the design and operation of advanced laboratory methods for the detection of emerging constituents. Each of these panelists shall have extensive experience as a principal investigator in their respective areas of expertise.
  - (2) The panel shall review the scientific literature and, within one year from its appointment, shall submit a report to the State Water Board and CDPH describing the current state of scientific knowledge regarding the risks of emerging constituents to public health and the environment. Within six months of receipt of the panel’s report the State Water Board, in coordination with CDPH, shall hold a public hearing to consider recommendations from staff and shall endorse the recommendations, as appropriate, after making any necessary modifications. The panel or a similarly constituted panel shall update this report every five years.
  - (3) Each report shall recommend actions that the State of California should take to improve our understanding of emerging constituents and, as may be appropriate, to protect public health and the environment.
  - (4) The panel report shall answer the following questions: What are the appropriate constituents to be monitored in recycled water, including analytical methods and method detection limits? What is the known toxicological information for the above constituents? Would the above lists change based on level of treatment and use? If so, how? What are possible indicators that represent a suite of CECs? What levels of CECs should trigger enhanced monitoring of CECs in recycled water, groundwater and/or surface waters?

- c. *Permit Provisions.* Permits for recycled water projects shall be consistent both with any CDPH recommendations to protect public health and with any actions by the State Water Board taken pursuant to paragraph 10(b)(2).

11. *Incentives for the Use of Recycled Water*

- a. *Funding*

The State Water Board will request CDWR to provide funding (\$20M) for the development of salt and nutrient management plans during the next three years (i.e., before FY 2010/2011). The State Water Board will also request CDWR to provide priority funding for projects that have major recycling components; particularly those that decrease demand on potable water supplies. The State Water Board will also request priority funding for stormwater recharge projects that augment local water supplies. The State Water Board shall promote the use of the State Revolving Fund (SRF) for water purveyor, stormwater agencies, and water recyclers to use for water reuse and stormwater use and recharge projects.

- b. *Stormwater*

The State Water Board strongly encourages all water purveyors to provide financial incentives for water recycling and stormwater recharge and reuse projects. The State Water Board also encourages the Regional Water Boards to require less stringent monitoring and regulatory requirements for stormwater treatment and use projects than for projects involving untreated stormwater discharges.

- c. *TMDLs*

Water recycling reduces mass loadings from municipal wastewater sources to impaired waters. As such, waste load allocations shall be assigned as appropriate by the Regional Water Boards in a manner that provides an incentive for greater water recycling.

Appendix 5-2. Central Coast Regional Water Quality Control Board Salt and Nutrient Management Plan Elements





## **Central Coast Regional Water Quality Control Board**

### **Salt and Nutrient Management Plan Elements:**

Paragraph 6.b.(3) of the Recycled Water Policy<sup>1</sup> states the following:

(3) Each salt and nutrient management plan shall include the following components:

- (a) A basin/sub-basin wide monitoring plan that includes an appropriate network of monitoring locations. The scale of the basin/sub-basin monitoring plan is dependent upon the site-specific conditions and shall be adequate to provide a reasonable, cost-effective means of determining whether the concentrations of salt, nutrients, and other constituents of concern as identified in the salt and nutrient plans are consistent with applicable water quality objectives. Salts, nutrients, and the constituents identified in paragraph 6(b)(1)(f) shall be monitored. The frequency of monitoring shall be determined in the salt/nutrient management plan and approved by the Regional Water Board pursuant to paragraph 6(b)(2).
  - (i) The monitoring plan must be designed to determine water quality in the basin. The plan must focus on basin water quality near water supply wells and areas proximate to large water recycling projects, particularly groundwater recharge projects. Also, monitoring locations shall, where appropriate, target groundwater and surface waters where groundwater has connectivity with adjacent surface waters.
  - (ii) The preferred approach to monitoring plan development is to collect samples from existing wells if feasible as long as the existing wells are located appropriately to determine water quality throughout the most critical areas of the basin.
  - (iii) The monitoring plan shall identify those stakeholders responsible for conducting, compiling, and reporting the monitoring data. The data shall be reported to the Regional Water Board at least every three years.
- (b) A provision for annual monitoring of Emerging Constituents/ Constituents of Emerging Concern (e.g., endocrine disrupters, personal care products or pharmaceuticals) (CECs) consistent with recommendations by CDPH and consistent with any actions by the State Water Board taken pursuant to paragraph 10(b) of this Policy.

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<sup>1</sup>[http://www.waterboards.ca.gov/water\\_issues/programs/water\\_recycling\\_policy/docs/recycledwaterpolicy\\_approved.pdf](http://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/docs/recycledwaterpolicy_approved.pdf)

- (c) Water recycling and stormwater recharge/use goals and objectives.
- (d) Salt and nutrient source identification, basin/sub-basin assimilative capacity and loading estimates, together with fate and transport of salts and nutrients.
- (e) Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis.
- (f) An antidegradation analysis demonstrating that the projects included within the plan will, collectively, satisfy the requirements of Resolution No. 68-16.

**The following is an expanded list of Central Coast Regional Water Quality Control Board recommended elements:**

(Note: clarification/definitions provided at end of document for elements marked with an asterisk.)

- **Background**
  - Recycled water policy overview
  - Existing related plans and projects (IRWMs, GMPs – AB3030, etc.)
  - Regulatory setting (303(d) listings, TMDLs, WDRs, local controls/ordinances, etc.)
  - Stakeholder list, roles and responsibilities
- **Groundwater Basin Description/Environmental Setting**
  - Climate (existing and forecast, i.e. climate change)
  - Geology
  - Hydrogeology/hydrology
  - Landcover and landuse evaluation/mapping
  - Existing/background groundwater and surface water quality conditions (inclusive of all groundwater/aquifers; i.e. shallow groundwater and domestic well water quality)
  - Beneficial uses
  - Recharge area identification/mapping/ranking
- **Source Analysis**
  - \*Conceptual model
  - Water Balance (existing and forecast)
  - Salt and nutrient balance (source identification and loading/concentration analysis; existing and forecast based on future growth)

- Fate and transport analysis (integrated surface water/groundwater modeling)
- Assimilative capacity analysis
- **Regional (basin/sub-basin) Monitoring Plan**
  - (see Recycled Water Policy paragraph 6.b.(3) for specifics)
  - \*Quality Assurance Project Plan (QAPP)
  - Data management and reporting (GAMA GeoTracker)
  - Water balance monitoring (in addition to water quality monitoring)
  - Monitoring parameters/constituents
  - Salt and nutrient balance and source loading monitoring (documentation of loading [reduction] by source)
  - Constituents of Emerging Concern (CEC) monitoring
  - Trend analysis
  - Monitoring plan implementation schedule
- **Goals and Objectives**
  - Recommended Water Quality Objectives (WQO) and goals
  - Beneficial use protection
  - Institutional controls, general plan amendments, local ordinances, etc.
  - Landuse planning
  - Management Practices (MPs); to reduce salt and nutrient loading
  - Sustainable water balance plan
  - Load allocations
  - Load reduction goals
  - Water conservation goals
  - Water recycling goals
  - Storm water retention/recharge goals
  - Recharge area protection/restoration
  - Wellhead protection
- **Implementation**
  - \*Performance measures
  - Implementation plan and schedule
  - \*Adaptive Management Plan; tied to regional monitoring
  - Public outreach and education
  - Cost analysis
  - Funding opportunities
  - \*Antidegradation Analysis
  - CEQA
  - Institutional agreements (between stakeholders for plan implementation)
  - Organizational structure or groups (technical advisory committees etc.)

## **Clarification/Definitions**

Conceptual model: a simple two dimensional drawing of the groundwater basin identifying all groundwater zones/aquifers and showing salt/nutrient and water quantity inputs and outputs from known sources such as adjacent groundwater basins, recharge, point and non-point sources, water purveyors, etc.

Quality Assurance Project Plan (QAPP): A Quality Assurance Project Plan documents the planning, implementation, and assessment procedures for a particular project, as well as any specific quality assurance and quality control activities. See following EPA website for more information:

<http://www.epa.gov/QUALITY/qapps.html>

Performance measures: Indicators of results or measures of effectiveness that provide qualitative and/or quantitative information needed to measure the extent to which a project is achieving its intended outcomes, objectives or goals.

Performance Measures are metrics used to provide an analytical basis for decision making and to focus attention on what matters most. Performance Measures answer the question, 'How is an organization or project doing at the job of meeting its objectives or goals?' Examples could include number of facilities implementing salt/nutrient management plans or the reduction of salt/nutrient loading from individual facilities/entities.

Adaptive Management Plan: Adaptive Management (AM), also known as Adaptive Resource Management (ARM), is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals; increases scientific knowledge; and reduces tensions among stakeholders

Alternatively, adaptive management is a structured, iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management. Adaptive management is often characterized as "learning by doing."

Typical steps in the process of Adaptive Management could include:

START: Clarify organization or project mission  
STEP A: Design a conceptual model based on known conditions  
STEP B: Develop a management plan: goals, objectives, and activities  
STEP C: Develop a monitoring plan  
STEP D: Implement management and monitoring plans  
STEP E: Analyze data and communicate results  
ITERATE: Use results to adapt and learn

Antidegradation Analysis: The State Water Board adopted Resolution No. 68-16 as a policy statement to implement the Legislature's intent that waters of the state shall be regulated to achieve the highest water quality consistent with the maximum benefit to the people of the state. An antidegradation analysis needs to be conducted demonstrating that the projects included within the plan will, collectively, satisfy the requirements of Resolution No. 68-16.



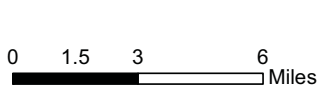
Appendix 5-3. Santa Maria Groundwater Basin Boundaries







Date: 7/11/2012 Name: SMGB Adjucation



# Santa Maria Groundwater Basin

**Legend**

Nipomo Mesa Management Area

Northern Cities Management Area

Santa Maria Valley Management Area

County/IRWMP Boundary



Appendix 5-4. SLO County IRWMP Planning Grant Application



- Invoices and monthly progress reports

**Task 19.4 Groundwater Basin Characterization for the Santa Maria Groundwater Basin**

The purpose of this task is to support critical groundwater basin characterization activities in the Northern Cities and Nipomo Mesa Management Areas of the Santa Maria Groundwater Basin. The proposed groundwater basin characterization activities are intended to support development of a groundwater flow model and SNMP for the two management areas.

The Central Coast RWQCB has documented widespread increases in salt and nutrient pollution in groundwater basins throughout the Central Coast Region and has determined that regional management plans and programmatic projects must be developed to protect the beneficial uses of the basins. One of these basins, the Santa Maria Groundwater Basin (SMGB) is a critical water supply resource for southern San Luis Obispo County and northern Santa Barbara County.

The SMGB has been subject to ongoing litigation since 1997. In 2005, a stipulation signed by many of the litigation parties divided the groundwater basin into three management areas: the Northern Cities Management Area (NCMA); the Nipomo Mesa Management Area (NMMA); and the Santa Maria Valley Management Area (SMVMA). The Stipulation was substantially accepted by the Court via the January 25, 2008 Judgment. The extent of the SMGB and the boundaries of the three management areas are shown in the figure below. Note that the SMGB underlies two IRWM Regions: San Luis Obispo County and Santa Barbara County.





A requirement of the Stipulation was the establishment of Technical Groups for the NCMA and NMMA to develop monitoring plans, administer the provisions of the stipulation and share groundwater information with the other management areas. Representatives of the NCMA Technical Group and the NMMA Technical Group along with their counterparts in the SMVMA believe that developing a SNMP is a critical step toward protecting the beneficial uses of the SMGB. The initial step in the development of a SNMP is to develop a better understanding of the hydrogeologic and hydrologic conditions that exist within a groundwater basin and to develop a groundwater model to help guide groundwater management activities.

This task is focused on developing a solid understanding of the basin geology and hydrogeology that can be utilized as a foundation for creating a groundwater model and ultimately a SNMP for the SMGB. The scope of work proposed for the SMGB was developed through a collaborative process between representatives from the NCMA and NMMA Technical Groups, as well as the District.

In July, 2010, representatives from the NCMA and NMMA Technical Groups convened a joint meeting to discuss shared issues and concerns related to ongoing management of the SMGB. The two Technical Groups agreed to form a joint subcommittee, including a representative from the District, to facilitate ongoing coordination and data sharing among the technical groups and the District. In August, 2010, the joint subcommittee had its first meeting and established the following goals:

1. Engage in regional planning efforts to develop regional water supply projects/strategies for the South County area
2. Develop common methodologies for establishing safe yield estimates
3. Develop a common framework/methodology for establishing groundwater elevation contours
4. Facilitate data sharing between the NCMA and NMMA Technical Groups
5. Develop a work plan and funding strategy for preparing a regional groundwater flow model
6. Consider data gaps and develop strategies for infill

Beginning in 2011, the joint subcommittee was expanded to include representatives from the SMVMA and the group changed its name to the Santa Maria Groundwater Basin Management Areas Technical Subcommittee (Technical Subcommittee). The Technical Subcommittee has held 13 meetings over the last two years, and has developed a comprehensive scope of work for groundwater basin characterization and the development of a groundwater model. The efforts within the NCMA and NMMA of the SMGB have been coordinated with the representatives from the SMVMA and are consistent with the work being completed in Santa Barbara County. This coordination between IRWM planning areas will ultimately allow for close integration of the SMGB planning and management activities being conducted by both IRWM regions.

The NCMA and NMMA agencies have completed numerous tasks related to and in preparation for the development of the groundwater model and SNMP. The tasks listed below have been completed since September 2008 and will be used as matching funds for this grant application.

NCMA TG	Costs	NMMA TG	Costs
2009-2011 Annual Monitoring Reports	\$331,000	2009-2011 Annual Monitoring Reports	\$100,000
Installation of Transducers	\$12,000	Deep Percolation Analysis	\$15,000
Well Head Improvements	\$24,600	Geological Cross-sections	\$20,000
Sub-Total	\$367,600	Sub-Total	\$135,000
Total In-Kind Contributions	\$502,600		

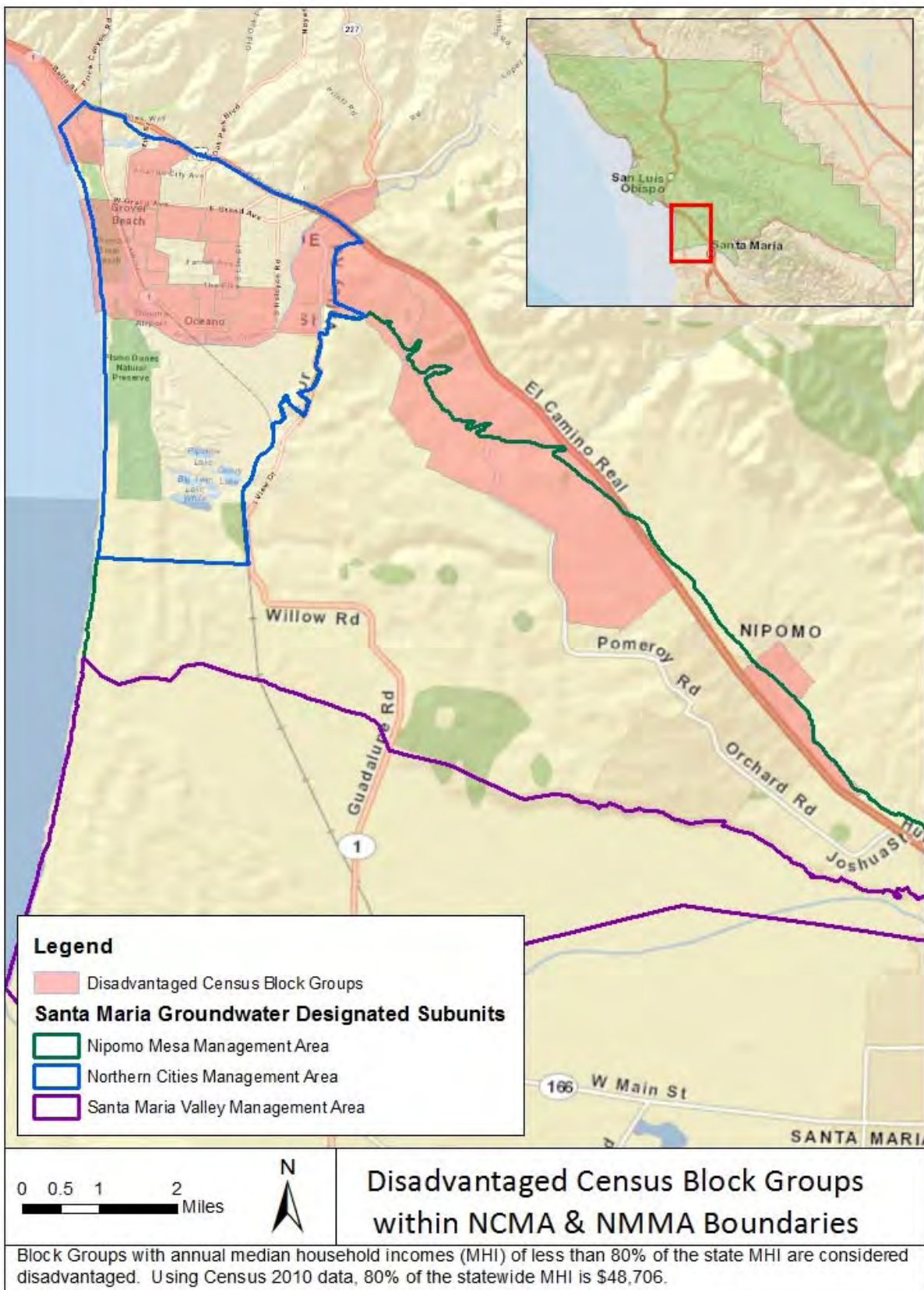
The development of a complete SNMP requires numerous elements related to the fate and transport of salts and nutrients within the groundwater basin. This scope contains tasks that will initiate the development of the SNMP for the basin, but will not produce a completed SNMP for the SMGB. The future work and preliminary cost estimates to develop a complete SNMP are shown below, and will build on the tasks performed in the SMGB Characterization scope of work. Funding for these future tasks will be obtained through additional grant opportunities, if successful, and/or proportionate contributions from the participating agencies.

- Collection of LIDAR elevation data within the NCMA and NMMA boundaries (\$100,000)
- Construction and calibration of a groundwater flow model (\$450,000)
- Development of a complete SNMP for the SMGB (\$200,000)

The findings of the SMGB Characterization and the development of a SNMP will benefit other proposed projects in the SLO Region. An improved understanding of the hydrogeology and salt and nutrient movement will help prevent the development of recycled water programs in the SMGB from detrimentally impacting the water quality in the basin.

The NCMA and NMMA boundaries overlay several DACs within San Luis Obispo County. The figure below shows the census blocks that have been identified as disadvantaged by the 2010 census that are within the boundaries of the NMCA and NMMA. The SMGB is one of the key water supply sources for the agencies within the NCMA and the only source of supply for the NMMA. Improved characterization of the groundwater basin will benefit the overlying DAC by providing the management areas technical groups with data to make more informed decisions related to improving water supply reliability, protecting water quality, and safeguarding this essential water supply resource.





The following tasks are necessary to characterize the geologic and hydrogeologic features of the NCMA and NMMA portions of the SMGB to provide a foundation for developing a groundwater model and a SNMP for the SMGB. Additional detailed study will be required to complete the SNMP and will be conducted in the latter phases of the project.

#### **Task 19.4.1 Project Management**

The District will act as the project manager for the development of the SMGB Characterization. The District will perform all administrative tasks required to complete the contract (execute consultant contracts, process invoices, etc.). Performance of project management tasks will be coordinated with a Steering Committee, as described below.

#### **Steering Committee**

Develop a steering committee, which will include representatives from each of the participating agencies<sup>1</sup>. The steering committee will provide input to the District for the SMGB Characterization project management activities (RFP development, consultant selection, deliverable review, etc.). Additionally, steering committee input recommendations and endorsements will be obtained at all significant project decision points. The steering committee will operate by consensus; however, when consensus cannot be reached, majority opinion will prevail. No grant budget has been allocated for this task, as it is assumed that the work under this task will be performed by the steering committee as in-kind contribution from the participating agencies.

#### **Progress Reports**

Prepare monthly progress reports and invoices and other administrative tasks necessary to comply with the quarterly reporting requirements of the IRWM Planning Grant agreement. No grant budget has been allocated for this task, as it is assumed that the work under this task will be performed by the steering committee as in-kind contribution from the participating agencies.

#### **Develop RFP(s) for Consultant Support and Consultant Selection**

This task will include developing RFPs to support the proposed groundwater basin characterization projects. Consultant proposals will be evaluated and a consultant will be selected. No grant budget has been allocated for this task, as it is assumed that the work under this task will be performed by the steering committee as in-kind contribution from the participating agencies.

#### **Consultant Project Management/Meetings**

This task includes all project management activities and meeting attendance required by the consultant(s) to facilitate the project.

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<sup>1</sup> It is anticipated that the agencies participating on the Steering Committee will include the District, City of Arroyo Grande, City of Grover Beach, City of Pismo Beach, Oceano Community Services District, Nipomo Community Services District, Woodlands Mutual Water Company, Golden State Water Company and ConocoPhillips.

***Deliverables:***

- Final RFP
- Invoices and monthly progress reports

**Task 19.4.2 Data Analysis**

Extensive geologic and hydrogeologic analysis has been performed on the SMGB. The steering committee will work collaboratively with the consultant to obtain previously completed analysis and prevent redundant work from being completed as part of the scope of work for SMGB Characterization.

**Data Compilation**

Review previous completed geologic and hydrogeologic studies and develop a database of available resources. Database should include previously completed: technical reports; monitoring plans; monitoring reports; response plans; legal documents; well data; topographic data; aerial imagery; etc. Quality assurance/quality control (QA/QC) of the data will be conducted for any duplicate records and general checking of the data from various sources for uniform formats, parameters, and spatial information.

**Identify Data Gaps**

Review the compiled data and information and identify any significant data gaps related to the development of a groundwater model and SNMP. Prioritize the data gaps to assist in developing the specific scope of work for the subsequent tasks.

***Deliverables:***

- TM that summarizes the available information, the data compilation and organization approach and results, and the existing data gaps.
- DVD of all material compiled in electronic format

**Task 19.4.3 Groundwater Basin Characterization****Transducer Installation**

Evaluate the existing network of monitoring wells within the NCMA and NMMA and identify wells for the installation of water level and/or temperature and electro conductivity transducers. Priority should be given to monitoring wells that: integrate into the NMMA's Water Shortage and Conditions Response Plan; integrate into the NCMA agency's response plans; materially advance the calibration and accuracy of the proposed groundwater model; have bore hole logs and known well screen depths.

Budget is based on installing pressure/temperature/conductivity probes in four monitoring wells (one (1) Sentry Well and three (3) of the new County monitoring wells).

**Geologic Cross-Sections**

Evaluate available hydrogeologic information and select 10 - 12 locations to develop geologic cross-sections. Develop geologic cross-sections using bore hole lithologic logs and other

**Geologic Cross-Sections**

Evaluate available hydrogeologic information and select 10 - 12 locations to develop geologic cross-sections. Develop geologic cross-sections using bore hole lithologic logs and other available information. Coordinate with the steering committee to select locations that will be most beneficial to the development of the groundwater model and the SNMP.

**Well Testing**

Evaluate the existing network of pumping and monitoring wells and select 8-10 representative locations to perform well testing. Utilize well testing results to determine aquifer and transmissivity characteristics.

**Surface Water Infiltration**

Investigate and quantify infiltration into the groundwater basin from surface water bodies within the NCMA and NMMA. Specific areas of interest include, but are not limited to: Arroyo Grande Creek; Los Berros Creek; Meadow Creek; Nipomo Creek.

**Recharge Areas**

Investigate areas within the basin that would be suitable for supplemental groundwater recharge. Evaluate different recharge mechanisms including: stormwater detention ponds; percolation ponds; injection wells; etc.

**Offshore Aquifers and Seawater Intrusion**

Review existing technical reports and analyze aquifer characteristics for offshore aquifers and evaluate the potential for seawater intrusion.

***Deliverables:***

- TM(s) that summarizes the results of the Groundwater Basin Characterization for the NCMA and NMMA portions of the SMGB

**Task 19.4.4 Goals and Objectives****Develop goals and objectives**

Hold a public workshop to review the results of the Groundwater Basin Characterization and establish goals and objectives for the groundwater model and SNMP for the SMGB.

Incorporate comments received during workshop and the public comment period into the final Groundwater Basin Characterization TM(s).

**Climate Change**

Complete the DWR Vulnerability Assessment Checklist related to climate change. The assessment will utilize the projected climate change conditions as described in the reports titled Projected Future Climatic and Ecological Conditions in San Luis Obispo County, April 2010, and Integrated Climate Change Adaptation Planning in San Luis Obispo County, November 2010.

These two reports form the basis for updating climate change conditions and assessing climate change vulnerabilities in the SLO Region IRWM Plan.

Changes to the local climate are likely to include more frequent and intense storms and floods, extended drought, increased wildfire, and more heat waves. As depicted in the text box below, numerous conditions that are expected to change may impact SMGB characterization including accelerating sea level rise and lower groundwater recharge rates.

**Possible changes by the end of the century:**

- hotter, drier, and longer summers
- less warming in western county compared to eastern county
- more severe storms in winter/spring
- accelerating sea level rise
- loss of coastal wetlands, marshes, and estuaries
- declines in water availability and water quality for streams and rivers
- lower groundwater recharge rates
- loss of native species and ecosystems
- loss of many pine forests
- increase in wildfire by 200-300%
- lower productivity of range for cattle
- increase in invasive species

The reports provide SLO community members and decision-makers with local climate change projections that are presented in a way that can help them make educated long-term planning decisions. The information will help inform the recycled water planning in assessing the impacts to wastewater flow and water quality characteristics and changes in potential recycled water demands.

The information will be incorporated into the Climate Change section of the IRWM Plan.

***Deliverable:***

- One public workshop to will be conducted. A PowerPoint presentation and summary notes for the workshop will be prepared.



Appendix 5-5. Monitoring Program for the Northern Cities Management Area





# **Monitoring Program for the Northern Cities Management Area**

**Prepared for**

**The Northern Cities**

**By**

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**July 2008**

# Monitoring Program for the Northern Cities Management Area

July 2008

This report was prepared by the staff of Todd Engineers under the supervision of professionals whose signatures appear hereon. The findings or professional opinions were prepared in accordance with generally accepted professional engineering and geologic practice.



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## Table of Contents

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1.	Introduction .....	1
1.1.	Background .....	1
1.2.	Judgment .....	1
1.3.	Objectives of Monitoring Program.....	2
1.4.	Reporting Requirements .....	2
2.	Elements of the NCMA Monitoring Program .....	3
2.1.	Hydrologic Conditions .....	3
2.1.1.	Precipitation.....	3
2.1.2.	Evapotranspiration.....	3
2.1.3.	Surface Water. ....	3
2.1.4.	Other Recharge.....	4
2.2.	Water Demand.....	4
2.2.1.	Land use.....	4
2.2.2.	Urban Water Management Plans (UWMPs). ....	5
2.2.3.	Population.....	5
2.3.	Water Supply .....	5
2.3.1.	Lopez Supply.....	5
2.3.2.	State Water Project. ....	5
2.3.3.	Groundwater. ....	6
2.3.3.1.	Pumping .....	6
2.3.3.2.	Water Levels .....	6
2.3.3.3.	Water Quality .....	7
2.3.3.4.	Seawater Intrusion.....	9
3.	Data Organization.....	10
4.	Protocols.....	12
4.1.	Climate and Hydrology Data.....	12
4.1.1.	Precipitation.....	12
4.1.2.	Evapotranspiration.....	12
4.1.3.	Surface Water. ....	13
4.2.	Groundwater Monitoring.....	13
4.1.4.	Wells Used for Monitoring.....	14
4.1.5.	Groundwater Elevations. ....	14
4.1.6.	Water Quality. ....	14
5.	Annual Report .....	16
6.	References .....	17

### **List of Tables**

Table 1. List of selected wells in the NCMA

Table 2. List of drinking water systems in the NCMA

Table 3. List of tables in the NCMA DB

### **List of Figures**

Figure 1 – Regional map showing location of the NCMA

Figure 2 – Stream Ggages

Figure 3 – Weather Stations

Figure 4 – Groundwater Well Locations

## 1. Introduction

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### 1.1. Background

This Monitoring Program is a joint effort of the Northern Cities, namely the City of Arroyo Grande, City of Grover Beach, City of Pismo Beach and the Oceano Community Services District (CSD). The Northern Cities and Northern Landowners have actively and cooperatively managed surface water and groundwater resources for more than 30 years. This is recognized in the 2002 Settlement Agreement between the Northern Cities, Northern Landowners, and Other Parties and in the 2005 Settlement Stipulation for the Santa Maria groundwater basin adjudication, which was adopted by the Court in its Judgment After Trial, entered January 25, 2008 (herein “Judgment”).

The Monitoring Program is a key component of the Judgment and forms the basis of the Annual Reports for the Northern Cities Management Area. As shown in Figure 1, the Northern Cities Management Area (NCMA) represents the northernmost portion of the Santa Maria Groundwater Basin. Adjoining the NCMA to the southeast is the Nipomo Mesa Management Area, while the Santa Maria Valley Management Area encompasses the remainder of the groundwater basin.

This Monitoring Program includes a discussion of the various elements to be monitored within the NCMA. As described in this document, the Monitoring Program will obtain pertinent information on an annual basis through data requests to agencies, field work, and online research. Data from these sources will be compiled into a comprehensive database, the Northern Cities Management Area Database (NCMA DB). The results of the monitoring program and NCMA DB will be used to prepare an Annual Report as described in Sections IV D of the Settlement Stipulation.

### 1.2. Judgment

On January 25, 2008, the Judgment after Trial was handed down from the Superior Court of California, County of Santa Clara. The Judgment approves the June 30, 2005 Stipulation agreed upon by numerous parties, including the Northern Cities, and orders the stipulating parties to comply with each and every term of the Stipulation. The 2002 Settlement Agreement is affirmed as part of the Judgment and its terms incorporated into the Stipulation, except for the provisions regarding continuing jurisdiction, groundwater monitoring, reporting, and the Technical Oversight Committee that are superseded by the respective provisions of the Stipulation.

As specified in the Judgment, groundwater monitoring in the Northern Cities Management Area will be conducted by the Northern Cities. The Judgment requires all Management Areas (including the NCMA) to prepare a Monitoring and Reporting Program within 180 days from the Judgment, in other words by July 23, 2008, and present it to the Court for approval.

### **1.3. Objectives of Monitoring Program**

The Monitoring Program, in accordance with requirements of the Judgment, is designed to collect and analyze data pertinent to water supply and demand. For example, the Monitoring Program must document:

- Land and water uses in the basin,
- Sources of supply to meet those uses,
- Groundwater conditions (including water levels and water quality).

### **1.4. Reporting Requirements**

The results of the NCMA Monitoring Program will be documented and discussed in Annual Reports which are due to the court 120 days after the end of each calendar year. An outline for the first Annual Report, which will be submitted by April 30, 2009, is included in Section 5 of this document.

## 2. Elements of the NCMA Monitoring Program

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This section of the NCMA Monitoring Program identifies required data and presents specific steps for data collection and analysis.

### 2.1. Hydrologic Conditions

Hydrologic and climatological data for the NCMA will be used in the calculation of water demand, in assessments of recharge to groundwater, and for comparison to water use.

#### 2.1.1. Precipitation.

Historical rainfall data have been compiled on a monthly basis for the NOAA Pismo Beach station for 1949 to 2005. Precipitation data from 2005 to present are available from a County-operated rain gage in Oceano. Data from the Oceano gage will be requested from the County, compiled on a monthly basis, and incorporated into the annual report. Additional precipitation data from other local rain gages will be collected for comparison with the Oceano data on an as-needed basis. In the event that data from the Oceano station become unavailable, another suitable station will be used.

#### 2.1.2. Evapotranspiration.

The California Irrigation Management Information System (CIMIS) maintains a weather station in Nipomo that records additional climatological data including temperature, wind speed, humidity, and evapotranspiration (ET). These data will be downloaded from the CIMIS website and added to the monitoring program database. The CIMIS Nipomo station has been in operation from 1996 to the present. CIMIS operates two other stations near the City of San Luis Obispo (stations 52 and 160). These stations have period of records from 1986 and 2000, respectively. Data from these stations may be used to confirm and/or supplement the data from the Nipomo station.

#### 2.1.3. Surface Water.

Surface water discharge data support the calculation of stream percolation to groundwater. The gage on Arroyo Grande Creek near Arroyo Grande (see Figure 2), originally installed and operated by the United States Geological Survey (USGS), has the most consistent stage-discharge curve for conversion of stage height to stream discharge. The County has five stream gages on Arroyo Grande Creek and one on Los Berros Creek, as shown on Figure 2. Surface water stage data are primarily available from San Luis Obispo County's monitoring network of electronic stream gages. These data will be requested from the County annually. A rating curve, to calculate flow rates, is available for the former USGS gage on Arroyo Grande Creek. Other rating curves may become available for the other surface water sites within the next few years. At that time, the additional data from these stations may be used to assess stream infiltration. Until

supplemental rating curve data become available, additional stream synoptic surveys should be considered to better understand stream infiltration.

#### **2.1.4. Other Recharge.**

Other sources of recharge into the groundwater basin will also be monitored. Other sources may include storm water recharge ponds operated by the cities. Updated information about these storm water systems should be added to the NCMA DB. This could include actual measurements of inflow and outflow from ponds. If such specific data are not available, then useful information would include location and capacity of ponds, location and extent of relevant urban watersheds, and information on rainfall/runoff relationships. Storm water quality data also would be useful.

In addition, data and information about other types of recharge that may be added in the future should also be collected and added to the NCMA DB.

## **2.2. Water Demand**

A key component of the monitoring program is the documentation of water demand. In the NCMA, water demand falls into two major categories: urban demand and agricultural demand. These will be evaluated using available land use data, urban water management plans, and population data.

#### **2.2.1. Land use.**

Land use information for the NCMA is basic to the quantification of water demand inside and outside of the incorporated areas. DWR land use surveys are generally scheduled for completion every ten years; the last one for the NCMA was completed in 1995. The most recent land use survey was completed by the San Luis Obispo Agricultural Commission in 2007 as part of the County's Master Plan Update. The County plans to update the land use map as part of each Master Plan Update. While the schedule for future updates is not set, it is expected to be about every ten years. When available, new land use maps will be requested from DWR and the County.

In addition, planning maps and up-to-date land use information are also available from the four municipalities. This information can aid in identifying areas of cropland conversion to urban uses and in determining the density of urban populations.

Land use will be used primarily to estimate agricultural water demand in the NCMA. Land use maps provide information such as acreage and type of crops in the area. Agriculture water use statistics, published by DWR for Detailed Analysis Units (DAU), will be combined with information from the land use maps to estimate total demand. These statistics (available for 1998-2001 and found at <http://www.landwateruse.water.ca.gov>) include applied water use, consumptive use, and crop ET coefficients. More recent data will be downloaded from the website when



available. The DWR Agricultural Water Use Specialist for the Southern District and the County Agricultural Commissioner's Office will be contacted as needed to provide information on specific cropping and irrigation patterns (e.g., double-cropping and use of drip irrigation) that affect water demand.

A summary of the type of agricultural land in the area and a table of the DWR water use statistics for the Arroyo Grande DAU will be included in the NCMA DB.

#### **2.2.2. Urban Water Management Plans.**

Urban water demand will be compiled directly from Urban Water Management Plans (UWMPs) which are prepared every five years; the next UWMPs are due in 2010. This information can be updated using water service connection numbers from Pismo Beach, Arroyo Grande, and Grover Beach. Oceano CSD is not required to prepare a UWMP because of its limited number of connections. Oceano's demand will be calculated from census data, number of water service connections, and appropriate multipliers for household use.

#### **2.2.3. Population.**

To confirm the data presented in the UWMPs and to calculate water demand for Oceano CSD, population data will be obtained from census data which are available online by census tract at <http://www.census.gov/main/www/access.html>. Population estimates will be used to confirm the municipal water demand totals and estimate domestic use outside the urban areas. New census data will be reviewed when available. The next US Census will take place in 2010.

### **2.3. Water Supply**

The NCMA has three major sources of water supply: Lopez Reservoir, State Water Project, and groundwater.

#### **2.3.1. Lopez Reservoir.**

All four municipalities in the NCMA receive water from Lopez Reservoir. Data on the volume of Lopez deliveries will be compiled for each municipality and entered into the NCMA DB. Expected deliveries for future years will also be examined.

#### **2.3.2. State Water Project.**

The City of Pismo Beach and Oceano CSD receive water from the California State Water Project (SWP). Data on the volume of water delivered to these municipalities will be compiled in the NCMA DB. Estimates of SWP availability in terms of annual allocations for long-term contractors will be obtained from the Department of Water Resources website on SWP analysis and water deliveries (<http://www.swpao.water.ca.gov/deliveries/>).

### **2.3.3. Groundwater.**

#### **2.3.3.1. Pumping**

Location and volume of pumping data are recorded by the Northern Cities. Additional pumping from non-urban domestic and agricultural uses will be based on the estimated water demand. These data will be collected or calculated annually and compiled in the NCMA DB.

#### **2.3.3.2. Water Levels**

Groundwater elevation data will be used to monitor annual effects of groundwater use, groundwater recharge, and changes in groundwater storage. There are approximately 145 wells within the NCMA that the County has monitored at some time in the past. The County currently monitors 38 of these wells on a semi-annual basis, including five “sentry wells” located along the coast. The County monitors more than 70 additional wells in the southern San Luis Obispo County area. These wells are shown on Figure 3. Wells logs are available for 23 of these wells, 15 located within the NCMA. Information regarding water level monitoring protocols are provided in Section 4 of this report. Water level data will be requested on an annual basis and the NCMA DB will be updated. Wells may be added or subtracted from the monitoring program, and the compilation and analysis of water level data may be modified as needed.

A subset of twenty wells within the NCMA was created to focus the analysis of annual water level changes. These key wells will be used to create hydrographs and contour maps showing long-term water level trends and regional groundwater conditions. Wells were selected for this detailed analysis based on the following criteria:

- Part of the County’s current monitoring program,
- Detailed location information available,
- Geographically distributed,
- Well depth known and/or well log available,
- Long and relatively complete record.

The wells selected are shown in Table 1 below and on Figure 3 in yellow. For the annual report, the hydrographs will be updated with new data, and water level data from the fall monitoring event will be mapped and contoured. The fall water levels are selected for mapping to promote consistency from year to year, as spring levels fluctuate in response to precipitation. Additional data from wells both inside and outside the NCMA may be used in the construction of the contour map. When possible, the same wells will be used to construct each contour map. The wells

selected as a subset for further analysis may be modified in the future to more accurately monitor the overall conditions of the groundwater basin.

**Table 1. List of Selected Wells in the NCMA**

<b>Well</b>	<b>Screened Interval Elevation (feet Mean Sea Level)</b>	<b>Water Elevation Data Available</b>	<b>Water Quality Data Available</b>
11N/35W-05N02	258'-278'	X	
12N/35W-29N01	80-98'	X	
12N/35W-29R03	385-305'	X	
12N/35W-30K03	40-58', 85-87', 94-100	X	
32S/13E-28K02	59-101'	X	
32S/13E-31H08	90-140'	X	X
32S/13E-31H09	380-520'	X	X
32S/13E-32D03	114'-128'	X	X
32S/13E-32D11	305'-459', 545'-597'	X	X
32S/13E-33A05	18-40'	X	
32S/13E-33K03	64-82'	X	
32S/13E-30N01	15-40'	X	
32S/13E-30N02		X	
32S/13E-30N03	60-135'	X	
<b>Sentry Wells</b>			
12N/36W-36L01	227-237'	X	X
12N/36W-36L02	535-545'	X	X
12N/36W-12C01	280-290'	X	X
12N/36W-12C02	450-460'	X	X
12N/36W-12C03	720-730'	X	X
32S/12E-24B01	48-65'	X	X
32S/12E-24B02	120-145'	X	X
32S/12E-24B03	270-435'	X	X
32S/13E-30F01	15-30'	X	X
32S/13E-30F02	40-55'	X	X
32S/13E-30F03	305-372'	X	X

#### **2.3.3.3. Water Quality**

Water quality is a key element of documenting available water supply. Contaminants from anthropogenic sources or seawater intrusion can potentially impact the basin, reducing the available water supply.

Currently the sole source of consolidated water quality information for the area is the California Department of Public Health (DPH formally DHS). The Northern Cities and other community systems in the NCMA submit water quality data to the DPH annually. These data are then uploaded to a state-wide water quality database. Data

from DPH will be requested annually and used to update the NCMA DB. Locations of these wells are not released by DPH, but some well locations are available from the individual water systems. A list of water systems from the DPH water quality database is listed below.

**Table 2. List of Drinking Water Systems in the NCMA**

Drinking Water System	Number of Monitoring Locations
ARROYO GRANDE, WATER DEPARTMENT	12
DOUBLE J MOBILE ESTATES	2
GRANDE MOBILE MANOR	2
GROVER BEACH WATER DEPARTMENT	7
HALCYON WATER SYSTEM	3
KEN MAR GARDENS MHP	2
LA MESA WATER COMPANY	1
LAGUNA NEGRA MWC	3
MESA DUNES MOBILE HOME ESTATES	5
OCEANO COMM SERVICES DIST.	14
PACIFIC DUNES RANCH	2
PISMO BEACH WATER DEPARTMENT	14
RIM ROCK WATER COMPANY	2

Data from DPH Water Quality database.

Groundwater quality monitoring is conducted at 73 locations within the NCMA and vicinity. No map of these locations is provided because of restrictions placed on the distribution of these data in accordance with the DPH, which provides monitoring results for 69 locations. The remaining four groundwater quality sampling locations are the Sentry Wells. These wells will be sampled regularly, in conjunction with depth to water measurement collection. Current plans are underway for cooperative water quality monitoring at the Sentry Wells between the Northern Cities, the Nipomo Mesa Management Area, and San Luis Obispo County. The Sentry Wells, shown on Figure 3, will be sampled quarterly for a range of constituents to detect the first signs of seawater intrusion. These constituents include the major cations and anions, plus selected constituents such as total nitrogen, bromide, and iodide. The analytes, frequency and number of Sentry Wells monitored may be adjusted as needed.

The methodology of using water quality data to assess seawater intrusion analysis is discussed in the next section. Water quality monitoring protocols are found in Section 4.

#### **2.3.3.4. Seawater Intrusion**

The NCMA is underlain by a coastal aquifer system that extends offshore. The aquifers include an interface between freshwater and seawater. While the location of the freshwater-seawater interface(s) is not known, there is currently an estimated net outflow of freshwater from the basin to the ocean and no known seawater intrusion into the water supply aquifers. However, given the potential for intrusion, coastal groundwater levels and quality will be carefully monitored.

As part of the NCMA Monitoring Program, groundwater levels near the coast will be assessed and reported with a focus on the Sentry Wells. Each Sentry Well has multiple ports to monitor water levels at different elevations. Water levels in all ports will be examined relative to one another (to assess vertical differences) and to mean sea level.

Water quality monitoring of coastal wells will provide early warning of seawater intrusion. Depth-specific water quality monitoring of the Sentry Wells can help document any vertical variability of seawater intrusion. Evaluation of water quality data will include time plots of specific constituent concentrations (for example, chloride) that identify freshwater and seawater mixing. Other geochemical methods to identify seawater intrusion may be applied as warranted, including preparation of Piper, Schoeller and brine-differentiation plots.

### 3. Data Organization

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The data collected and measured as part of the monitoring program will be compiled into a comprehensive Northern Cities Management Area database (NCMA DB). The relational database is designed to be updated with new data annually and to generate tables and charts for inclusion in the Annual Report. The tables in the database begin with a prefix, indicating the general type of data found in the table. These prefixes are:

- HY – Hydrologic and climate data
- LU – Land use data
- POP – Population data
- SW – Surface water data
- WELL – Well data (location, construction, etc.)
- WL – Water level data
- WQ – Water quality data
- WS – Water supply data.

A list of proposed NCMA DB tables is found in Table 3. When applicable, each table contains a source field indicating where or from whom the data were collected. The database will be updated annually with data collected from all relevant sources. Tables and fields in the database may be added, subtracted, or modified as needed to better incorporate the data.

**Table 3. List of Tables in the NCMA DB.**

Table Name	Brief Description
HY_CIMIS_202	Hydrologic data (precip, ET, temperature) downloaded from the CIMIS Station #202 Nipomo
HY_Monthly_Precip_All	Monthly precip for the NOAA station at Pismo Beach (1949-2005) and SLO County precip data from Oceano (2005-current)
Hy_SW_Precip_SLO	SLO County data for precip stations and surface water locations
LU_Applied_Water	DWR Agricultural Water Use Statistics- Applied water by crop type in acre-feet per year per acre
LU_Consumed_Fraction	DWR Agricultural Water Use Statistics- Percent of irrigation water consumed by crop
LU_Crop_ET	DWR Agricultural Water Use Statistics- Crop ET coefficients
LU_DWR_Basin_Summary	Summary of agricultural areas in the basin, source: DWR
LU_DWR_DAU_Summary	Summary of agricultural areas in the DAU, source: DWR
LU_SIO_CO_Basin_Summary	Summary of agricultural areas in the basin, source: SLO County
LU_SLO_CO_DAU_Summary	Summary of agricultural areas in the DAU, source: SLO County
Pop_Population_City	Population data from City's UWMP
Pop_USCensus_2000	Population data from the 2000 Census
SW_SLO_Locations	Locations of County surface water stations
SW_Stormwater_Ponds	Information on the City's stormwater ponds
WELL_Comment_SIO_08	Comment codes for the County's water level data
WELL_LOCATIONS_All	Master well table. Contains locations, construction, notes, etc.
WL_DTW_All	Water level data from all sources, as depth to water in feet
WL_WSE_All	Water elevation data from all sources in feet below mean sea level
WQ_Data_All	All available water quality data
WQ_DHS_Locations	Locations with DHS water quality data
WQ_STORET	Storet chemical numbers
WS_Total	Municipal water supply by month

## 4. Protocols

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The collection of data will be conducted in accordance with the following protocols. These data will be collected annually in January and integrated into the project database and analyzed for the Annual Report to be submitted by April 30<sup>th</sup> of each year.

### 4.1. Climate and Hydrology Data

Climate and hydrology data will be collected from existing monitoring stations maintained by the County and by CIMIS.

#### 4.1.1. Precipitation.

Precipitation data are collected by San Luis Obispo County; the locations of seven selected stations are shown on Figure 4. There are three different types of County monitored rain gages: tipping-bucket, rain gages with radio transmitters, and static rain gages. Static gages are read by volunteers and the hand written records are submitted to the County annually (EDAW 1998). Most precipitation data in the area are electronically collected using a tipping-bucket rain gauge connected to a datalogger with remote telemetry capability. The tipping-bucket gage is capable of measuring and recording rainfall in increments equivalent to at least one-hundredth of an inch (0.01). Each tip event is recorded with a date and time stamp to identify storm events and these data are summed for total monthly and annual precipitation.

Precipitation data for the NCMA area will be collected from the County-operated rain gage in Oceano, as shown on Figure 4. The Oceano rain gage is a tipping-bucket gage. Additional precipitation data from County-operated rain gages on Arroyo Grande Creek upstream of the NCMA, near Nipomo, as well as a CIMIS operated climate station in Nipomo and San Luis Obispo (Figure 4) will also be collected for comparison and data quality analysis as needed of the data from the Oceano gauge.

#### 4.1.2. Evapotranspiration.

California Irrigation Management Information System (CIMIS) operates climate stations with evapotranspiration (ET) information and other climate data across California. Many factors affect ET including weather parameters such as solar radiation, air temperature, relative humidity, and wind speed; soil factors such as soil texture, structure, density, and chemistry; and plant factors such as plant type, root depth and foliar density, height, and stage of growth. Although ET can be measured using such devices as lysimeters, estimating ET using analytical and empirical equations is a common practice because measurement methods are expensive and time consuming. Reference crop evapotranspiration is widely used as a reasonable estimate of the ET rate of a reference



crop, usually turf, expressed in inches. Reference crops are either grass (ETo) or alfalfa (ETr) whose biophysical characteristics have been studied extensively. At the Nipomo CIMIS weather station, the reference crop (with standard conditions for calculating ETo) is a well-watered, actively growing, closely-clipped grass that completely shades the soil. The input variables used in the CIMIS equation and the steps to calculate ETo are described on the CIMIS website at <http://www.cimis.water.ca.gov/cimis/infoEtoEquation.jsp>.

#### **4.1.3. Surface Water.**

Surface water discharge data are available primarily from the County's network of data-recording stream gages. The collection of stream discharge data is accomplished by measuring stream stage height and subsequently calculating discharge from a stage-discharge curve. Stage-discharge curves are created by manually collecting successive discharge and stage height measurements. For high flows, the County uses Hydrologic Engineering Centers River Analysis System (HEC- RAS) to develop rating curves from recorded flow depth. In addition to HEC-RAS, it is recommended that the Northern Cities work with the County to ensure that rating curves adhere to the USGS standards described in *Techniques of Water-Resources Investigations of the United States Geological Survey, Chapter A8 – Discharge Measurements at Gaging Stations* (USGS, 1969). Stage height data at each gage site are collected using a transducer in a stilling well connected to a datalogger with remote telemetry capability. Electronic stage height records for this gage would be used to calculate discharge using the County maintained stage-discharge curve, when available.

Currently, no ongoing monitoring of surface water quality is performed in the area. However, any future monitoring should be consistent with the Surface Water Ambient Monitoring Program (SWAMP) guidelines to enable data integration with the larger state-wide databases. SWAMP monitoring protocols are available at [http://www.swrcb.ca.gov/water\\_issues/programs/swamp/qamp.shtml](http://www.swrcb.ca.gov/water_issues/programs/swamp/qamp.shtml). The key procedures and protocols for surface water quality sampling are available at this site in as appendices to the report on Quality Assurance and Quality Control, Appendix D – SWAMP Field Collection Standard Operating Procedures and Appendix E - SWAMP Field Data Measurement Standard Operating Procedures (SOP).

## **4.2. Groundwater Monitoring**

Groundwater monitoring will rely primarily on the long-established monitoring programs of the Northern Cities and County. The wells within the network and the monitoring protocols are described below.

#### **4.1.4. Wells Used for Monitoring.**

The County's selection of monitoring locations has generally been based on the following criteria:

- Willingness of well owners to allow access to and use of private wells
- Access to wells
- Ability to physically collect measurements from the wells.

The location and elevation for each well within the monitoring network has been measured using handheld Global Positioning System (GPS) units. The GPS measured elevation is collected at a marked location on the well that will be used in the future for referencing depth to water measurements for calculation of groundwater elevation. Location and reference point elevation data are recorded in the project database with other pertinent well information (owner, common name, state well number, etc.). Well construction details are also collected and recorded in the project database when they are available. Well logs from thousands of wells in San Luis Obispo County are kept on file at both the County Engineering and Health Departments (EDAW 1998).

#### **4.1.5. Groundwater Elevations.**

San Luis Obispo County has been monitoring and compiling water level data across the County since the 1950's. The County maintains a database of over 625 wells (EDAW 1998). Groundwater elevations are monitored in all of the wells indicated above at least twice annually. Groundwater elevations are monitored in the County monitored wells semiannually in April and October. County personnel measure water levels in the active monitoring network to ensure consistency of the data (EDAW 1998). Depth to water measurements from each well are collected relative to the appropriate reference point using an electric water level indicator in general accordance with American Society for Testing and Materials (ASTM) Standard D4750-87 (ASTM, 2001). Care is taken to collect depth to groundwater measurements when pumps in the wells are not in operation. If a pump cannot be turned off, then collection of a depth to groundwater measurement is either postponed or the measurement is noted to have been taken while the pump was operating. Groundwater elevations are calculated by subtracting the depth to groundwater measurement from the reference point elevation.

In addition to the County's program, the Northern Cities will monitor groundwater elevations in the Sentry Wells in January and July.

#### **4.1.6. Water Quality.**

Groundwater quality is monitored in drinking water wells throughout the area. In addition, the Sentry Wells along the coast will be monitored quarterly. Groundwater quality sampling at drinking water wells is conducted to comply with Title 22 of the California Code of Regulations. These wells will be sampled in accordance with ASTM Standard D4448-01 (ASTM, 2007) and the samples will be analyzed by a State Certified

Laboratory for the major ions (calcium, bicarbonate, carbonate, chloride, magnesium, potassium, sodium, and sulfate) plus selected constituents for seawater intrusion such as bromide, iodide, and total nitrogen. When applicable, water quality data will be collected consistent with Groundwater Ambient Monitoring and Assessment (GAMA) programs. The GAMA policies and protocols are derived from U.S. Geological Survey Techniques of Water-Resources Investigations (USGS 1997 to present).

## 5. Annual Report

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The monitoring and reporting program will support preparation of an Annual Report that documents water demand, water supply, and the conditions of the groundwater basin. The Annual Report will be submitted to the court within 120 days after the end of each calendar year. The first Annual report will be submitted by April 30, 2009. A preliminary outline of the Annual Report is shown below.

### **Preliminary Annual Report Outline**

1. Introduction
2. Management Activities
3. Climatic Conditions
  - 3.1. Precipitation
  - 3.2. Evapotranspiration
4. Water Demand
  - 4.1. Land Use
  - 4.2. Population
  - 4.3. Water Use by City
    - 4.3.1. Urban Water Management Plans
  - 4.4. Changes in Current and Projected Water Demand
5. Water Supply
  - 5.1. Sources of Supply
    - 5.1.1. Lopez Reservoir
    - 5.1.2. State Water Project
    - 5.1.3. Developed Water
    - 5.1.4. Groundwater
  - 5.2. Groundwater Conditions
    - 5.2.1. Water Levels
      - 5.2.1.1. Hydrographs
      - 5.2.1.2. Change in Storage
    - 5.2.2. Water Quality
      - 5.2.2.1. Time Concentration Plots
      - 5.2.2.2. Trends
    - 5.2.3. Seawater Intrusion
      - 5.2.3.1. Water Levels
      - 5.2.3.2. Water Quality Changes
  - 5.3. Threats to Water Supply
6. Comparison of Demand and Supply
7. Expected Future Conditions
8. Recommendations
9. References

## 6. References

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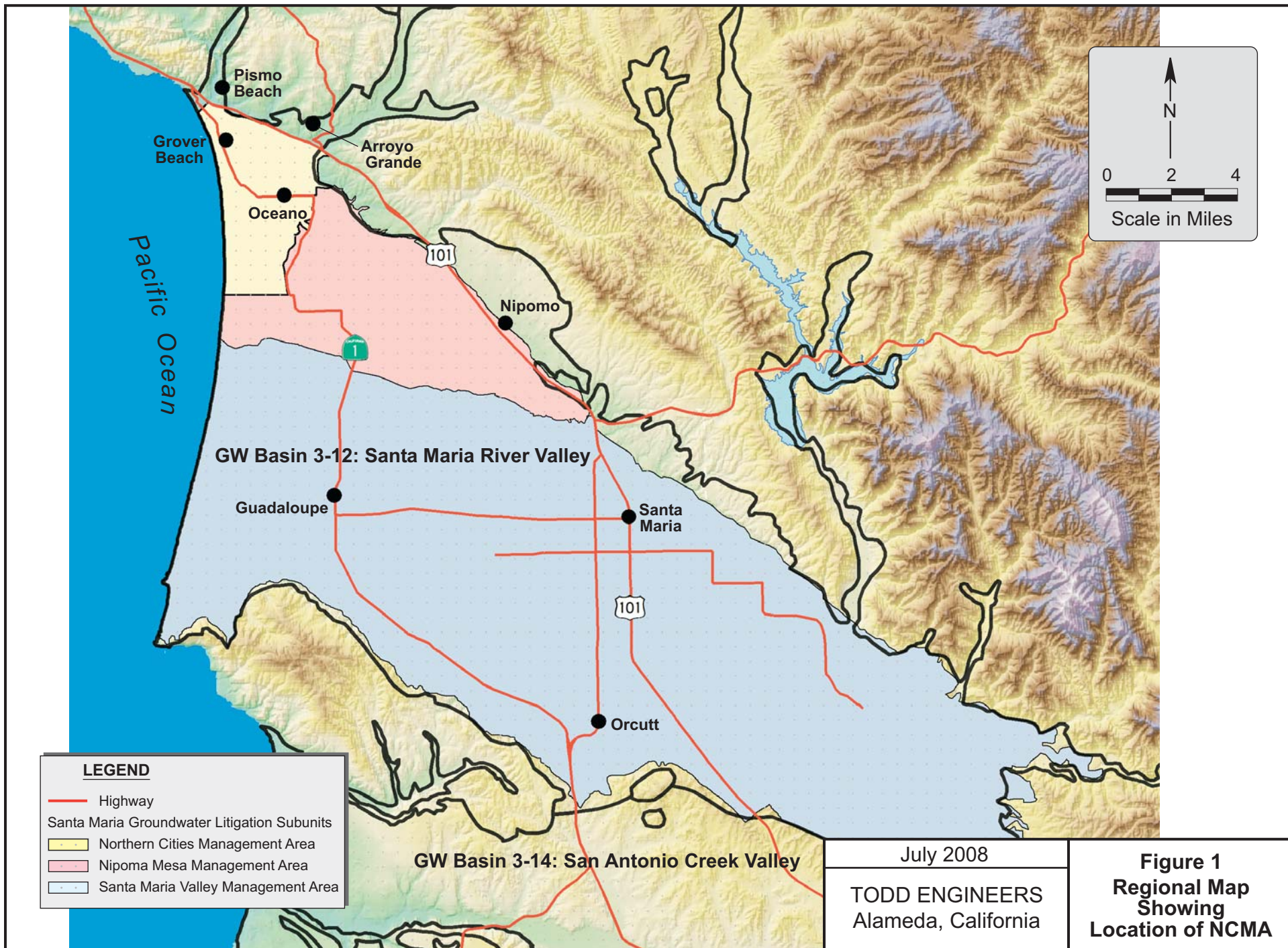
ASTM International (ASTM), Designation D 4448-01, Standard Guide for Sampling Ground-Water Monitoring Wells, 2007

ASTM International (ASTM), Designation D 4750-87, Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well), 2001

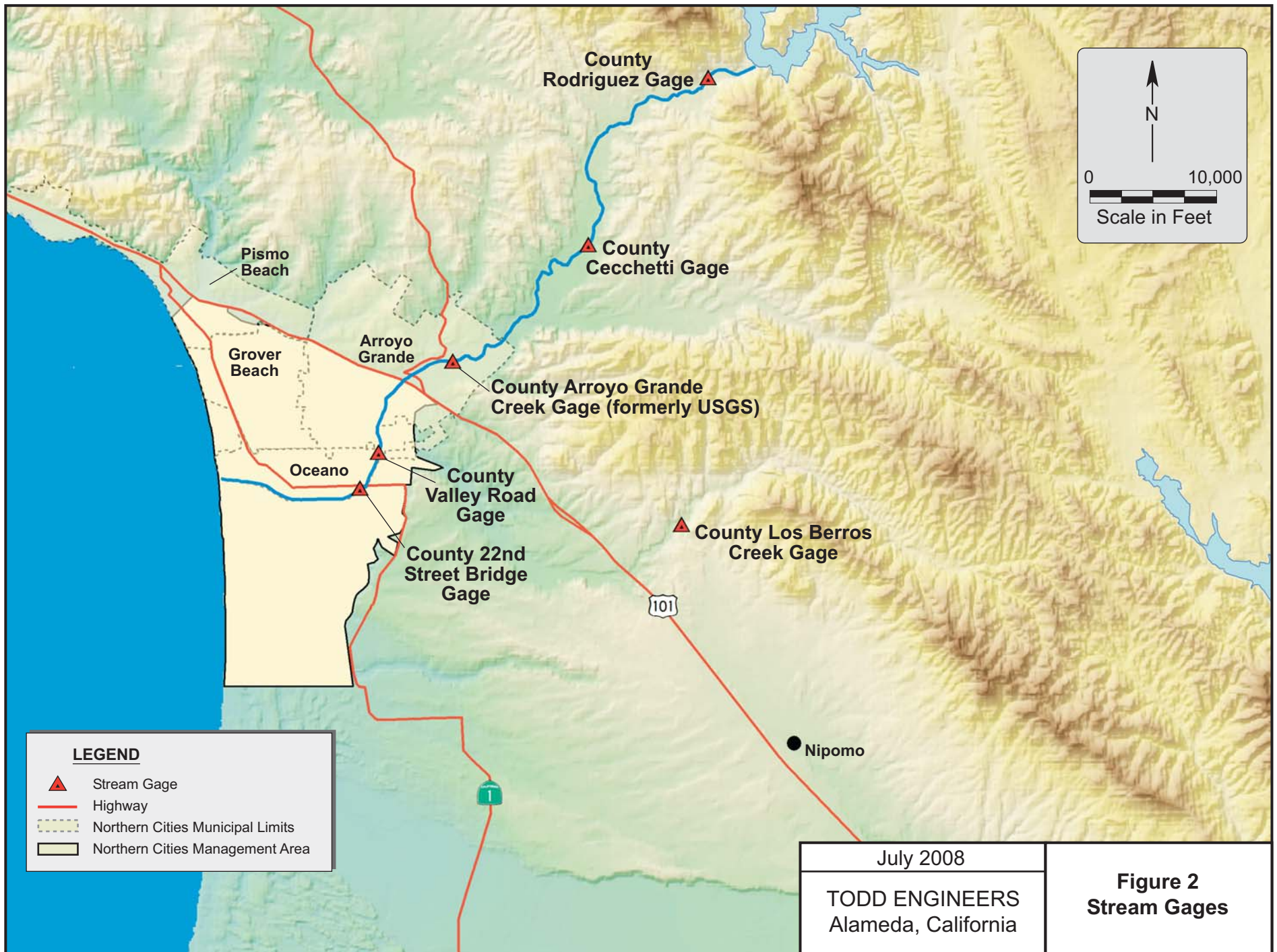
EDAW, San Luis Obispo County Master Plan Update, August 1998.

U.S Geological Survey (USGS), U.S. Geological Survey Techniques of Water-Resources Investigations <http://water.usgs.gov/owq/FieldManual/>, 1997 to present.

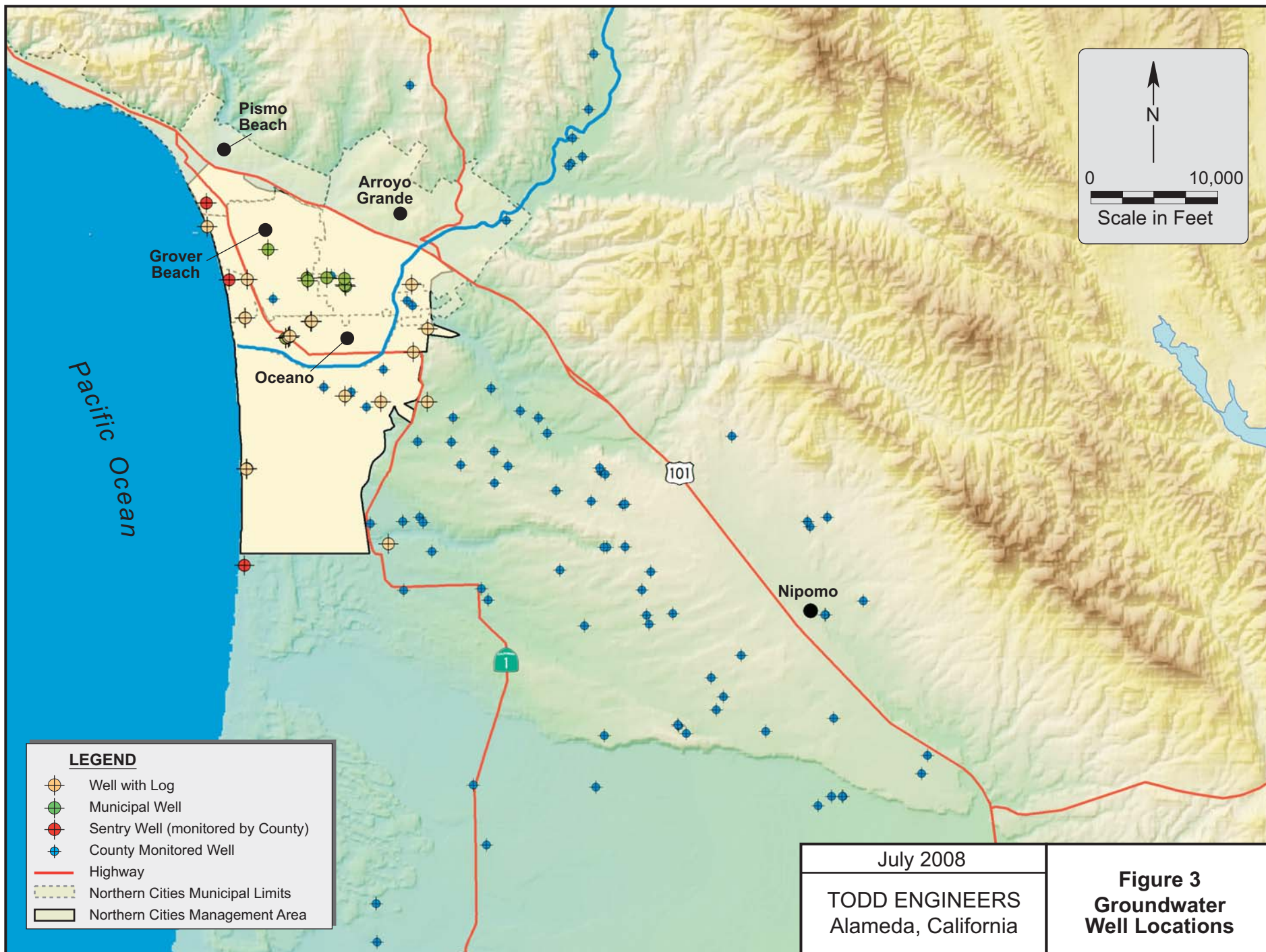
# FIGURES



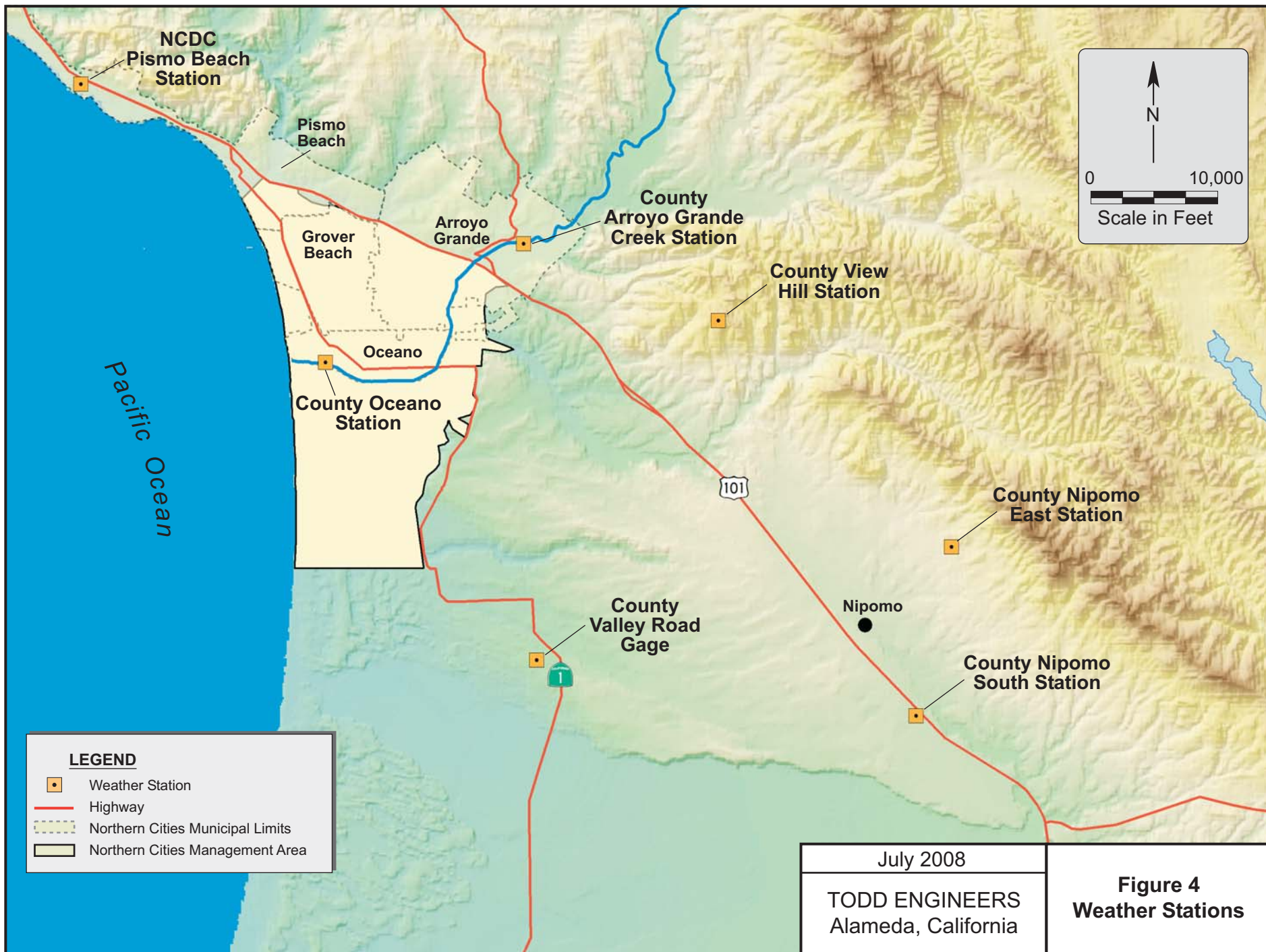












Appendix 5-6. Monitoring Program for the Nipomo Mesa Management Area



# Nipomo Mesa Monitoring Program

Prepared by

Nipomo Mesa Management Area Technical Group

August 2008

## Table of Contents

1	INTRODUCTION .....	3
1.1	Background .....	3
1.2	Judgment .....	3
1.3	Technical Group .....	5
1.4	Objectives Of Monitoring Program .....	6
1.5	Reporting Requirements .....	6
2	MONITORING PARAMETERS .....	7
2.1	Groundwater Elevations .....	7
2.2	Groundwater Quality .....	8
2.3	Precipitation .....	9
2.4	Streamflow .....	9
2.5	Surface Water Quality and Usage .....	9
2.6	Land and Water Uses Impacting NMMA Water Balance .....	10
2.7	Groundwater Pumping (Measured) .....	10
2.8	Groundwater Pumping (Estimated) .....	10
2.9	Wastewater Discharge and Reuse .....	11
3	DATA ANALYSIS & WATER SHORTAGE TRIGGERS .....	11
3.1	Data Analysis .....	11
3.2	Water Shortage Triggers .....	12
	APPENDIX – MONITORING POINTS .....	13

# **1 INTRODUCTION**

## **1.1 Background**

This Monitoring Program is a joint effort of the Nipomo Mesa Management Area (“NMMA”) Technical Group (“Technical Group”). The Technical Group was formed pursuant to a requirement contained in the 2005 Stipulation (“Stipulation”) for the Santa Maria Basin Adjudication. Sections IV D (All Management Areas) and Section VI (C) (Nipomo Mesa Management Area) contained in the Stipulation were independently adopted by the Court in the Judgment After Trial<sup>1</sup> (herein “Judgment”). The Monitoring Program is a key component of the portions of the Judgment that involve the NMMA and forms the basis for subsequent analyses of the basin to be included in Annual Reports for the NMMA.

This Monitoring Program includes a discussion of the various parameters to be monitored within the NMMA, and a discussion of data analysis methods and water shortage triggers. The Monitoring Program provides a permanent foundation for the type of information to be regularly monitored and collected. However, the Technical Group is expected periodically to evaluate and update the Monitoring Program to ensure it provides comprehensive information sufficient to assess the integrity of water resources within the NMMA. For example, the Technical Group may change or expand monitoring points or types of data to be collected and otherwise periodically amend the Monitoring Program. Material amendments will be submitted for court approval.

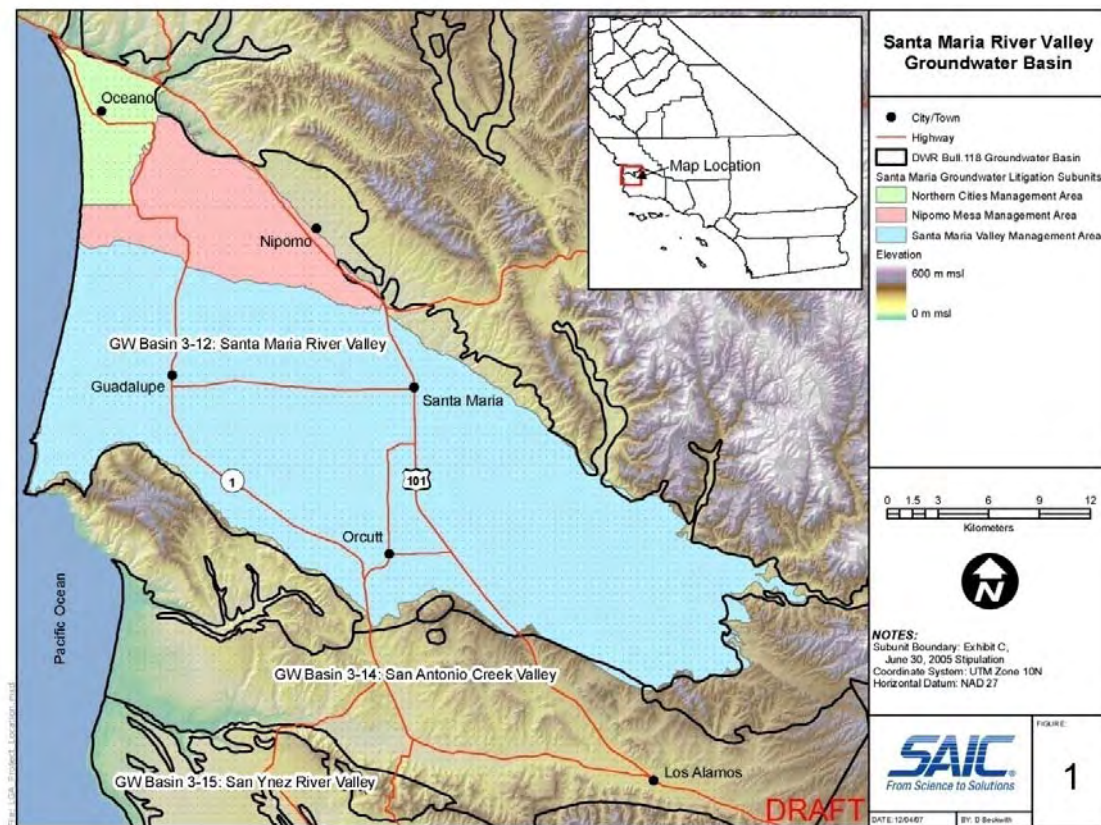
## **1.2 Judgment**

As a component of the physical solution for the Santa Maria groundwater basin, the Judgment requires the development and implementation of comprehensive monitoring and reporting in each of three Management Areas in the basin – Northern Cities Management Area, Nipomo Mesa Management Area, and Santa Maria Valley Management Area (Figure 1). For each of these Management Areas the Judgment specifies:

“A Monitoring Program shall be established in each of the three Management Areas to collect and analyze data regarding water supply and demand conditions. Data collection and monitoring shall be sufficient to determine land and water uses in the Basin, sources of supply to meet those uses, groundwater conditions including groundwater levels and quality, the amount and dispositions of Developed Water supplies, and the amount and disposition of any sources of water supply in the Basin.

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<sup>1</sup> The Judgment is dated January 25, 2008 and was entered and served on all parties on February 7, 2008. This Monitoring Program is to be submitted for court approval on or before August 6, 2008.



**Figure 1. Santa Maria groundwater basin location map.**

Within one hundred and eighty days after entry of judgment, representatives of the Monitoring Parties from each Management Area will present to the Court for its approval their proposed Monitoring Program.”

The Judgment also requires the NMMA and the Santa Maria Valley management area technical committees to submit for court approval the criteria that trigger responses to "potentially severe and severe shortage conditions" that are specified in the Judgment.

An additional requirement of the Judgment is an Annual Report:

“Within one hundred and twenty days after each Year, the Management Area Engineers will file an Annual Report with the Court. The Annual Report will summarize the results of the Monitoring Program, changes in groundwater supplies, and any threats to Groundwater supplies. The Annual Report shall also include a tabulation of Management Area water use, including Imported Water availability and use, Return Flow entitlement and use, other Developed Water availability and use, and Groundwater use. Any Stipulating Party may object to the Monitoring Program, the reported results, or the Annual Report by motion.”



Each Management Area Monitoring Plan will provide the basis for the preparation of the annual reports and the data to support the evaluations for the potentially severe and severe water shortage conditions relevant to the NMMA and the Santa Maria Valley management area.

### 1.3 Technical Group

The NMMA Technical Group is designated as the Monitoring Party for the NMMA.

#### Membership

The NMMA Technical Group is designated in the Judgment as including representatives appointed by Nipomo Community Services District, Southern California Water Company (now known as Golden State Water Company), ConocoPhillips, Woodlands Mutual Water Company, and an agricultural overlying owner who is also a Party to the Stipulation. The service areas of purveyors in the Technical Group are indicated in Figure 2.

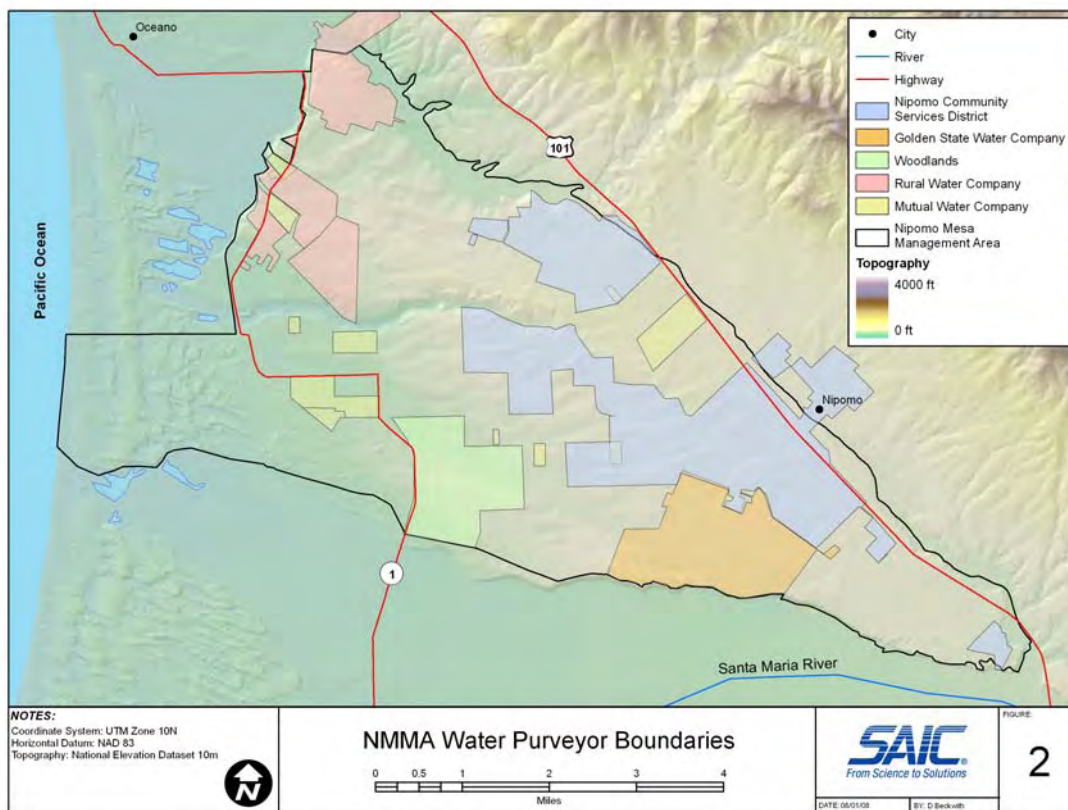


Figure 2. Water purveyors within the NMMA.

## Role

The Technical Group is responsible for preparing the Monitoring Program, conducting the Monitoring Program, and preparing the Annual Reports. The Technical Group may hire individuals or consulting firms to assist in the preparation of the Monitoring Program and Annual Reports (the Judgment describes these individuals or consulting firms as the “Management Area Engineer”). The Technical Group has the sole discretion to select, retain, and replace the Management Area Engineer.

To assist the Technical Group in monitoring and analyzing water conditions in the NMMA, Stipulating Parties are required to provide monitoring and other production data at no charge, to the extent that such data have been generated and are readily available. The Technical Group is required to adopt rules and regulations concerning measuring devices that are consistent with the Monitoring Programs of other Management Areas when feasible.

If the Technical Group is unable to agree on any aspect of the Monitoring Program, the matter may be taken to the Court for resolution.

## Cost Sharing

The Technical Group functions are to be funded by contribution levels negotiated by Nipomo Community Services District, Golden State Water Company, Rural Water Company, ConocoPhillips, and Woodlands Mutual Water Company. In-lieu contributions through engineering services may be provided, subject to agreement by those parties. The budget of the Technical Group shall not exceed \$75,000 per year without prior approval of the Court.

### ***1.4 Objectives Of Monitoring Program***

The objectives of the Monitoring Program are to establish appropriate data collection criteria and analytical techniques to be used within the NMMA so that groundwater conditions, changes in groundwater supplies, threats to groundwater supplies, water use, and sources of water can be documented and reported on an annual basis. In addition, data developed through the Monitoring Program will be relied upon to provide the criteria for potentially severe and severe water shortage conditions.

### ***1.5 Reporting Requirements***

The Monitoring Program shall be presented for Court approval consistent with the Judgment. The Annual Report shall be submitted to the Court by April 30 of each year (April 29 on leap years).

## **2 MONITORING PARAMETERS**

To satisfy the objectives of the Monitoring Program (section 1.4), data need to be collected from a variety of sources. The data to be collected include:

- Groundwater elevations measured in wells
- Water quality measured in wells
- Precipitation
- Streamflow
- Surface water usage
- Surface water quality
- Land use to the extent differential uses impact the NMMA water budget
- Groundwater pumping (measured)
- Groundwater pumping (estimated)
- Wastewater discharge and reuse amounts and locations

### ***2.1 Groundwater Elevations***

The San Luis Obispo County Department of Public Works, the U.S. Geological Survey, the California Department of Water Resources, and some groundwater users within the NMMA periodically gather groundwater elevation data on a large number of wells within the NMMA. Various members of the NMMA Technical Group already maintain these data in digital databases.

Current monitoring of groundwater elevations is conducted primarily by the County of San Luis Obispo, and additionally by Nipomo Community Services District, ConocoPhillips, Woodlands, Golden State Water Company, and Rural Water Company. The Monitoring Program will include compilation of groundwater elevations for a large number (93 initially) of groundwater wells located throughout the NMMA. Typically, groundwater elevations are measured during the fall and spring of each year. The initial list of the wells to be included in the Monitoring Program are shown in the Appendix.

The extensive current monitoring of groundwater elevations within the NMMA is sufficient to provide initial information on groundwater trends. However, there are four additional issues that the Technical Group will consider for further monitoring or analysis over the first years of implementation of the Monitoring Program:

- Additional existing coastal nested monitoring wells will be considered for inclusion in the groundwater elevation monitoring program. These include the 13K2-K6 nested site near Oso Flaco Lake (currently not being monitored) and the 36L1-L2 nested site in the coastal dunes west of Black Lake Canyon (outside the NMMA, currently monitored for groundwater elevations by SLO County).
- The wells used in the Monitoring Program will be investigated as necessary to ensure that the aquifer penetrated by the wells is verified.
- Additional wells may be added as necessary to the Monitoring Program in a phased approach to fill in data gaps recognized during preparation of the Annual Reports.
- The Technical Group may recommend that additional dedicated monitoring well(s) need to be installed at critical locations where no other information is available.

## **2.2 Groundwater Quality**

As an element of compliance with their drinking water reporting responsibilities, public water purveyors within the NMMA have historically gathered and reported groundwater quality data (filed with the California Department of Public Health). In addition, the U.S. Geological Survey, the California Department of Water Resources, and SLO County have also gathered some water quality data within the NMMA. Members of the NMMA Technical Group maintain these data in digital databases.

Of considerable importance is groundwater quality in wells near the ocean, the most likely site where any intrusion of seawater would first be detected. Because there was no current monitoring of groundwater quality in any of the coastal nested monitoring wells, the Monitoring Program will include the following:

- Coastal nested monitoring well site 11N/36W-12C (west of the ConocoPhillips refinery) is now monitored under agreement with SLO County and provides quarterly water quality sampling. Samples are collected for chloride, sulfate, and sodium lab analyses and pH, EC, and temperature are measured in the field.

Regular sampling and analyses of groundwater quality is an important component of the Monitoring Program, because of the potential threat of seawater intrusion at the coastline and potential water quality changes caused by pumping stress in other portions of the NMMA and the basin as a whole. Water quality does not change as rapidly as groundwater elevations, so quality monitoring does not have to be as frequent. With the addition of the coastal nested monitoring data, current water quality monitoring appears to be adequate. However, four aspects of the Monitoring Program will be further evaluated to ensure the ongoing adequacy of the Monitoring Program:

- The Technical Group will arrange to receive water quality monitoring results from purveyors within the NMMA, either directly from the purveyors or annually from the Department of Public Health.
- Coastal nested monitoring well site 12C will be evaluated to determine whether current quarterly sampling can be reduced in frequency (or field testing substituted for laboratory analysis), thus allowing funding for water quality monitoring of additional nested site 13K2-K6 near Oso Flaco Lake (not sampled for three decades) and the 36L1-L2 nested site in the coastal dunes west of Black Lake Canyon (last sampled 12 years ago).
- Each well used for monitoring of groundwater elevations will be tested once for general minerals (if such testing is not already conducted) as budgeting allows. This testing will help further define particular aquifer characteristics.
- A water quality monitoring contingency plan will be developed in the event that there are indications of seawater intrusion in coastal monitoring wells. This contingency plan will consider triggers for increased sampling, both in frequency and in added analytes (e.g., iodide, strontium, boron, oxygen/hydrogen isotopes).

## ***2.3 Precipitation***

There is a wide choice of existing precipitation stations that can be used to estimate rainfall within the NMMA. Two gauges are part of the ALERT Storm Watch System, Nipomo East (728) and Nipomo South (730). Other gauges include Simas (201.1), Black Lake (222), Runels Ranch (42.1), Oceano Wastewater Plant (194), Nipomo Mesa (152.1), Peny Ranch (175.1), Mehlschau (38), NCSO Shop (223), Nipomo CDF (151.1), and CIMIS Nipomo #202 Station. As part of the analysis for the Annual Reports, data from an appropriate subset of these gauges will be used to estimate precipitation each year.

## ***2.4 Streamflow***

Streamflow can be important both as an input and an output of the water balance for an area. Currently, streamflow within the NMMA is partially gauged. The Los Berros Creek gauge (Sensor 757) is located 0.8 miles downstream from Adobe Creek and 3.7 miles north of Nipomo on Los Berros Road. This station is located approximately where Los Berros Creek conveys water out of the NMMA.

Nipomo Creek is not currently being monitored and is observed to convey water out of the NMMA during some of the year. The Technical Group will consider whether monitoring of Nipomo Creek or any other surface water monitoring is necessary or appropriate.

## ***2.5 Surface Water Quality and Usage***

There has been limited surface water monitoring of the dune lake complex and in Black Lake Canyon by the San Luis Obispo Land Conservancy and others. The

Technical Group will evaluate whether this monitoring is sufficient and will obtain this and any additional related data as necessary and appropriate.

It is not known whether there are surface water diversions within the NMMA. The Technical Group will investigate this issue and determine whether additional monitoring is necessary and appropriate.

## ***2.6 Land and Water Uses Impacting NMMA Water Balance***

Land uses within the NMMA include agricultural, residential/commercial, and undeveloped areas. Land use surveys can be useful both in developing an overall water balance assessment and as an aide to estimate water use when such use is not directly measured. The most common method of conducting a land use survey is to obtain current digital aerial photography, classify the land uses, and create GIS mapping of the various land use classifications. In some cases, field checking is also required to confirm information obtained from aerial photography.

Where necessary, water use may be established based on the various types of land use within the NMMA. Information may be obtained from both published data (including San Luis Obispo County WPA-6) and any information compiled from existing stations installed in and around the NMMA that monitor climate data (CIMIS). This is described in greater detail in Section 2.8.

## ***2.7 Groundwater Pumping (Measured)***

Individual landowners, public water purveyors, and industry all rely on groundwater pumping from the NMMA. To the extent users measure their volume of use, these data will be reported to the Technical Group on an annual basis. Stipulating Parties to the Judgment are required to provide monitoring and other production data at no charge, to the extent that such data have been generated and are readily available.

Pursuant to paragraph 5 of the Judgment, the Technical Group retains the right to seek a Court Order requiring non-stipulating parties to monitor their well production, maintain records thereof, and make the data available to the Court or the Court's designee.

## ***2.8 Groundwater Pumping (Estimated)***

Some groundwater users do not measure the volume of their groundwater production, and thus, this increment of groundwater pumping will have to be estimated each year. There are several methods of estimating groundwater pumping when totalizing meters are not installed. For cooperating pumpers, electrical records for pumping can be used, with the most accuracy obtained when the wells are tested regularly for pump efficiency.

Another method of estimating agricultural pumping is through self-reporting or surveys of crop type and irrigated acreage. For agriculture, water use can then be

estimated using calculations that include crop water demand, effective precipitation, evapotranspiration, irrigation efficiency, and leaching requirements. An active California Irrigation Management Information System (CIMIS) station is located in the southern portion of the Woodlands within the NMMA and provides a useful reference for Nipomo Mesa evapotranspiration. A second active station is located adjacent to the Sisquoc River, above Tepusquet Creek.

For municipal or mixed rural lands, estimates will be based on acreage and development type. In some urban lands, a “unit water use” can be derived from average water consumption recorded from comparable or historical conditions.

To develop a complete picture of groundwater withdrawals for Nipomo Mesa, the Technical Group will develop methods for estimating unmetered groundwater pumping that will likely include some combination of those discussed above.

## ***2.9 Wastewater Discharge and Reuse***

Four wastewater treatment facilities discharge treated effluent within the NMMA and include the following: NCSD’s Southland Wastewater Treatment Facility in the eastern portion of Nipomo Mesa, NCSD’s wastewater treatment plant at Blacklake Village, Cypress Ridge’s wastewater treatment facility, and the Woodland’s wastewater treatment facilities. The Monitoring Program will include an annual compilation of wastewater treatment plant discharges, any reuse of the treated water (quantities and locations), and available water quality parameters.

# **3 DATA ANALYSIS & WATER SHORTAGE TRIGGERS**

The primary purpose of the Monitoring Program is to detect changes in groundwater conditions that indicate current and future water supply problems within the NMMA. Although the determination of methods of data analysis and subsequent triggers that can indicate negative water supply conditions are not elements of the Monitoring Program, initial assessment of these issues are the responsibility of the Technical Group. A short discussion of potential methodologies follows.

## ***3.1 Data Analysis***

The focus of data analysis is to help detect and predict whether any conditions exist that could harm the aquifer, either by excessive drawdown or by degrading water quality. In evaluating the Monitoring Program data, the Technical Group will establish methodologies to use monitoring data to define the “health” of the basin. Among the methodologies that the Technical Group will evaluate in developing potentially severe and severe water shortage triggers are:

- **Coastal monitoring wells** – trends in water quality and groundwater elevations. Establish criteria to recognize both the potential for seawater intrusion and evidence of actual seawater intrusion.
- **Coastal groundwater gradient** – the direction and magnitude of groundwater flow either towards the ocean or in a landward direction. Establish criteria to recognize conditions that could cause seawater intrusion.
- **NMMA-wide groundwater elevation contouring** – establish groundwater flow directions, detect areas of increased drawdown, determine how pumping patterns are affecting the basin and the effects of any changes in the location of pumping that may serve to mitigate negative impacts.
- **Key wells** – indicator wells in key areas that track changes in groundwater elevations and water quality. Establish criteria to determine whether monitored changes could potentially be harmful to the aquifers.
- **Groundwater in storage** – calculation of changes of groundwater in storage and consideration of changes of groundwater storage over time can be used to analyze trends in the basin hydrologic balance.

### ***3.2 Water Shortage Triggers***

The Stipulation requires that water level and water quality criteria are to be established that will trigger responses to potential water shortages (the potentially severe and severe water shortage conditions). The Technical Group will rely on the Monitoring Program data and protocol in establishing the proposed criteria for these triggers. The triggers points will be presented for court approval, as required in the Stipulation, prior to or concurrent with the filing of the first Annual Report in 2009. Annual Reports will include an assessment of basin conditions relative to the proposed trigger points.



## APPENDIX – MONITORING POINTS

The monitoring points shown on Figure A-1 and in Table A-1 are the 93 initial wells that the NMMA Technical Group determined would provide information to evaluate the health of the Nipomo Mesa portion of the Santa Maria basin. Many of the wells indicated are currently being monitored (see Table A-1), with the remainder planned to be monitored prior to preparation of the first Annual Report.

As discussed in the main text of this Monitoring Program, wells will be added and/or dropped in subsequent years as the basin is evaluated annually. The addition and/or subtraction of monitoring wells will be based on data gaps, areas of special concern that require more monitoring, and data redundancy. Information from some of the wells listed in Table A-1 that are monitored by the County of San Luis Obispo may not be available because of privacy concerns – this issue will be addressed prior to preparation of the first Annual Report.

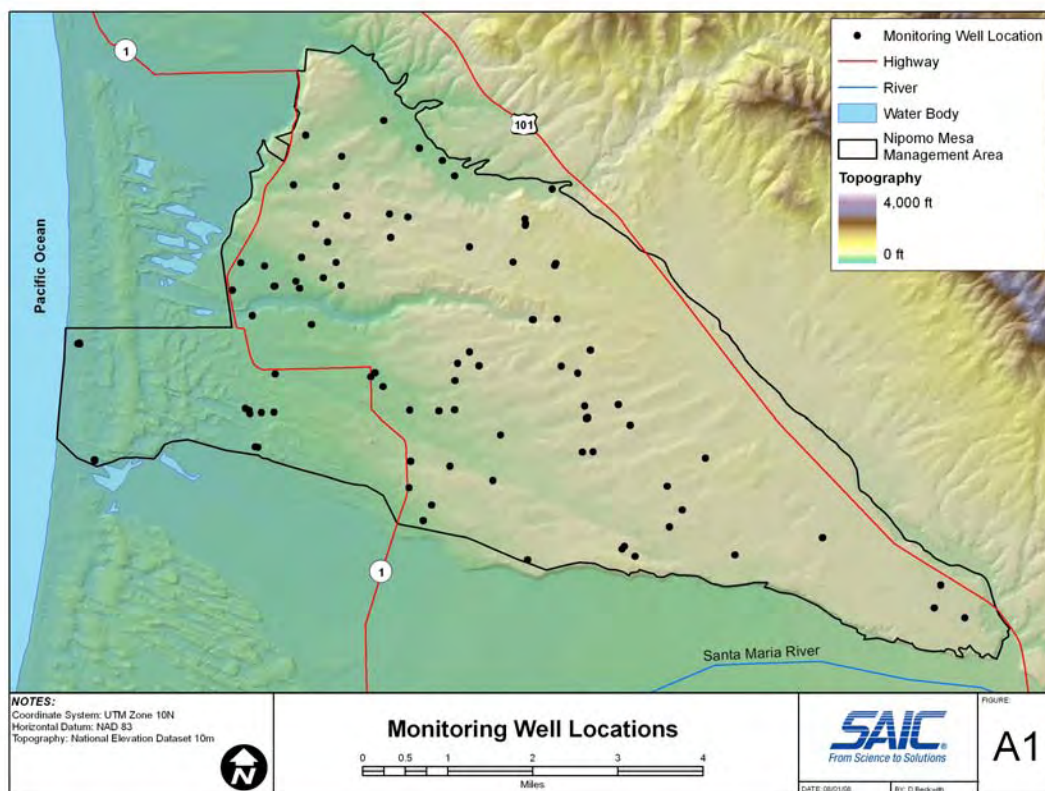


Figure A-1. Locations of monitoring points listed in Table A-1.